

American Aviation

MANAGEMENT
ENGINEERING
PRODUCTION
OPERATIONS
MAINTENANCE
EQUIPMENT



FEB. 2



Leslie O. Barnes, Director of Operations, Allegheny Airlines 13

Comet Certification Timetable 9



Avomat: Something New in Servicing 12



Boeing's GAPA Missile Photos 29



Cessna Award Raises Rumpus 52

PRICE COPY
35 cents



NEWEST MEMBER OF THE "DC" FAMILY

Here's a ship you'll be hearing plenty more about when she begins to go into service on U.S. airlines later this year.

She's the DC-7, newest and fastest (360 mph cruising, over 400 mph top speed) of the Douglas commercial family.

The DC-7 will seat from 60 to 95 passengers, will be capable of flying nearly 5,000 miles non-stop, and will provide a more luxurious, comfortable ride.

Models of the big ship now being built for four major domestic airlines* will be equipped with Honeywell electronic fuel measurement systems. These airlines specified the Honeywell system because of its great dependability and reputation for accuracy—direct results of Honeywell's high engineering, research, and material standards.

The same system has been specified by Pan American World Airways for their

latest DC-6B's. Military versions of these electronic fuel measurement systems are now standard equipment on more than 40 types of service aircraft.

Electronic fuel measurement systems represent only one of the many types of Honeywell products now in use by the aviation industry. We expect the list to grow longer in future years—because *automatic controls* are so important to aviation progress. And Honeywell has been the leader in controls for more than 60 years.

*American Airlines, Delta Air Lines, National Airlines, United Air Lines.

MINNEAPOLIS
Honeywell
Aeronautical Controls



AIRTRENDS

Aircraft industry will be 1953's largest U. S. employer of industrial workers. Mundy I. Peale, Republic Aviation's president, puts total at over 4.8 million, with more than 800,000 building planes and over 4 million in components, equipment and parts.

Two items illustrate scope of manufacturers' activities: (1) major west coast plane-builders have \$7.5 billion backlog and production hasn't caught up with new orders, (2) Douglas Aircraft's plants have a million-dollar-a-day payroll.

Reduction in Army's fiscal 1954 helicopter money from \$200 million to \$125 million won't have too much effect on manufacturers. Most of them are near peak production; little plant capacity is available.

Steel, copper and aluminum supplies will be adequate for maintenance of existing transport planes and for production of aircraft on order through first half of 1953. However, military and commercial planes will cost more. Aluminum companies have accepted a government-proposed price increase.

Disagreement over whose colors the airplane should bear (British European Airways' or Trans-Canada's) is the reason for cancelation of U. S. tour of British Viscount 701. Prototype 700 will visit Canada in February for winter tests, but there'll be no demonstration flights.

Areas for future airline expansion are limited. Best bets: helicopter field, U. S.-Europe-Middle East cargo, irregular service, new Alaskan service. This is CAB's thinking, expressed to Senate Small Business Committee (a group, incidentally, that may be dropped by the new Congress). CAB sees few, if any, opportunities for service comparable to those now operating on existing routes.

There's a hot internal row at CAB, involving 2-2 split of existing members, over whether to get several new route cases underway. Two members favoring action feel at least one major airline needs more competition. Vote split prevailed at recent CAB meeting, but matter hasn't been dropped.

Premium pay for last five hours of their 85 monthly flying hours will be sought by airline pilot negotiators in new contract talks. There's a possibility they may even ask 85 hours' pay for 80 hours' flying in some negotiations.

Cost of aircraft: In 1942, United Air Lines' entire fleet of 36 DC-3's had \$2.1 million book value, considerably less than presently-discussed price of one jet transport.

TWA claims 1952 world leadership in domestic and international tourist service (715 million passenger-miles), reveals it will double domestic and increase Atlantic low-fare flights this year.

Corporate and executive aircraft visiting Washington National Airport set new record during Inauguration. About 375 were at the field during three-day period.

No-show trend is increasing on some airlines's coach flights. This is taken as an indication that more businessmen are turning to coach, inasmuch as regular riders are more likely to no-show than occasional or first-riders.

The Washington View

The Same Old Story

Legislative proposals by the hundreds have been dropped into the hopper of both houses of a busy 83rd Congress. The following tabulation summarizes those bills relating to aviation, all of which have been introduced in previous years. Congressional investigations may well run in the forefront of any major legislation however. A number of probes previously instituted will be continued (such as that of the Preparedness Investigation Subcommittee of the Senate Armed Services Committee and the Interstate and Foreign Commerce Committee's study of transportation problems) and others will be initiated.

Legislative Scoreboard

Public Bills and Resolutions on Aviation Matters Introduced in the 83d Congress

Senate

S. 7, Pat McCarran (D., Nev.), to amend the Civil Aeronautics Act providing for the consolidation and merger of U.S. international air carriers. (—1)

S. 8, Pat McCarran, to create an independent Air Safety Board.

S. 9, Pat McCarran, to amend the Civil Aeronautics Act providing for the regulation of non-certificated air carriers and contract air carriers. (—1)

S. 12, Pat McCarran, to amend the Civil Aeronautics Act requiring Senate ratification of international air agreements. (—1)

S. 35, Pat McCarran, to amend the Federal Airport Act for time extension during which requests may be made for reimbursement for damages to public airports resulting from military operations. (—1)

S. 472, Homer E. Capehart (R., Ind.), To amend the Civil Aeronautics Act (On behalf of himself and 12 other Senators) so as to permit the granting of free or reduced rate transportation to ministers of religion. (—1)

S. Res. 22, Charles W. Tobey (R., N.H.), to continue until June 30, 1953, Commerce Committee's authority to survey the Interstate Commerce Commission.

S. Res. 23, Charles W. Tobey, to extend to June 30, 1953, the Commerce Committee's authority to make certain transportation studies. (—1)

S. Res. 41, Charles W. Tobey, to authorize the Commerce Committee to investigate matters within its jurisdiction, and authorizing expenditures of \$125,000 for that purpose during the 83d Congress. (—1)

House of Representatives

H. R. 66 E. J. Keogh (D., N.Y.), to amend the Internal Revenue Code for reduction of the transportation tax on persons from 15% to 10%. (—2)

H. R. 74, E. J. Keogh, to amend the Civil Aeronautics Act to permit construction and operation of heliports on or near Government buildings. (—1)

H. R. 91, H. B. Scudder (R., Cal.), to repeal the taxes on the transportation of persons. (—2)

H. R. 92, H. B. Scudder, to reduce the rate of tax on transportation of property to: 3% on the first \$100; 2% on the second \$100; 1% on any part over \$200. (—2)

H. R. 131, J. W. Heselton (R., Mass.), for the separation of subsidy from air-mail pay. (—1)

H. R. 201, V. Wickersham (D., Okla.), to amend the Civil Aeronautics Act to permit the granting of free or reduced-rate transportation to ministers of religion. (—1)

H. R. 287, Clare Hoffman (R., Mich.), for the separation of subsidy from air-mail pay. (—1)

H. R. 468, K. B. Keating (R., N.Y.), fixing punishment for the malicious destruction of aircraft or attempts to destroy aircraft. (—3)

H. R. 494, K. B. Keating, amending the Civil Aeronautics Act to require the preparation of passenger lists for all flights of commercial planes. (—1)

H. R. 519, S. K. McConnell (R., Pa.), to amend the Civil Aeronautics Act to permit the granting of free or reduced-rate transportation to ministers of religion. (—1)

H. R. 1225, Overton Brooks (D., La.), to amend the Act establishing the Civil Air Patrol as an auxiliary of the Air Force providing further assistance from the Air Force to CAP. (—4)

H. R. 1924, Carl Hinshaw (R., Cal.), to amend the Civil Aeronautics Act to permit the construction and operation of heliports on or near Government buildings. (—1)

H. R. 1925, Carl Hinshaw, civil airman's training bill to aid in meeting defense mobilization requirements. (—1)

H. R. 1926, Carl Hinshaw, jet-transport prototype construction which would provide Federal assistance in design, development and service testing. (Recommended by CAB). (—1)

H. R. 1927, Carl Hinshaw, exemption to air carriers from statutory provisions requiring payment for overtime services of customs employees. (—2)

Numbers in () at end of each description represents Committee to which bill was referred as follows.

(—1) Interstate and Foreign Commerce.

(—2) Ways and Means.

(—3) Judiciary.

(—4) Armed Services.

... Preble Staver



TIME WAS

when this French Caudron airplane represented the height of luxury in air travel. Back in 1920, its wicker seats and flower vases were described as "regal appointments of largest passenger carrying aeroplane—the richest looking—in service. Thousands of dollars have been spent making the cabin the acme of aerial comfort."



NOW

it is the luxury of AIRFOAM Super-Cushioning made only by Goodyear that makes every seat in such ultramodern liners as Boeing's Stratocruiser, today's "acme of aerial comfort." AIRFOAM not only cuts costly seat repairs and maintenance—but it lightens seat weight and its restful buoyancy lasts the life of the ship.

AIRFOAM is just one of many Goodyear Aviation Products which are serving aviation today. Goodyear has been contributing to aviation progress since 1909.

Goodyear, Aviation Products Division
Akron 16, Ohio or Los Angeles 54, California



Alfred M. The Goodyear Tire & Rubber Company, Akron, Ohio

MORE AIRCRAFT LAND ON GOODYEAR TIRES, TUBES, WHEELS AND BRAKES THAN ON ANY OTHER KIND

Be sure you'll like "THE GREATEST STORY EVER TOLD"—every Sunday—ABC Radio Network—THE GOODYEAR TELEVISION PLAYHOUSE—every other Sunday—NBC TV Network



SERVING THE INDUSTRY SINCE 1937
1025 Vermont Ave. N.W., Washington, D.C.

Editor and Publisher
Wayne W. Parrish

Executive Editor
Eric Bramley



Managing Editor
William D. Perreault



JAMES J. HAGGERTY, JR. Military Editor
JOSEPH S. MURPHY Technical Editor
WILLIAM V. HENZEY Transport Editor
ROBERT M. LOEBELSON Manufacturing Editor
PREBLE STAVER Legislative Editor
WALTER A. KILRAIN Copy & Production Editor
KEITH SAUNDERS News Analyst
ANTHONY VANDYK Internal Editor

FRED S. HUNTER West Coast Editor
LOIS C. PHILMUS Corporation Aircraft
RICHARD F. MCGRATH Special Assignments
DORIS ROWZEE Airline Statistics
R. G. WORCESTER Consultant
JEAN-MARIE RICHE Paris Editor
ROY PEARL London Editor

February 2, 1953

Vol. 16, No. 18

Jet Certification Timetable	9	National's Growth Record	27
New Plane Servicing System	12	Airline Safety Training	34
CAB's 'G-Men' Police Airplanes	15	Props for Turboprops	48
Economics of jet operation	17	Cessna Trainer Rumpus	52
Ramjet Stamping Ground	24	Best DC-3 Replacement	71

THIS MADE NEWS: Ike's plane and pilot, p. 11 . . . UAL safety seating, p. 16 . . . Convair rotates executives, p. 21 . . . Cessna Model 310 . . . Mobilizing corporate aircraft, p. 26 . . . Boeing fires a missile, p. 29 . . . Douglas tracks a plane, p. 32 . . . Microwave program for airlines, p. 39 . . . Aeroquip licensees . . . Omnitrange trainer, p. 42 . . . Aircraft stocks speculative, p. 45 . . . Props for turboprops, p. 48 . . . Plastics at Lockheed, p. 50 . . . Production photos, p. 54 . . . Passenger handling made easy, p. 66.

AMONG THE DEPARTMENTS: Editorial, p. 6 . . . Extra Section, p. 46 . . . Maintenance Bulletin Board, p. 47 . . . New Products, p. 57 . . . Technical Literature, p. 60 . . . People, p. 61 . . . Statistics, p. 62 . . . Airline Commentary, p. 64 . . . CAB News, p. 67 . . . International Report, p. 68 . . . Production Spotlight, p. 73 . . . Letters, p. 74 . . . Advertisers Index, p. 74 . . . Classified advertising (The Bulletin Board), p. 75 . . . En Route, p. 76.

General Manager: Leonard Elserer
Director of Advertising: Stephen R. Kent
Circulation Promotion Mgr.: Larry Brettner

American Aviation is published every other Monday by American Aviation Publications Inc., Washington, D. C. Printed at the Telegraph Press, Harrisburg, Pa. Subscription rates for United States, Canada, Mex. & C. Central and South American countries—\$5.00 for 1 year; \$8.00 for 2 years; \$10.00 for 3 years. All other countries—\$7.00 for 1 year; \$12.00 for 2 years. Entered as Second-Class matter in Washington, D. C., and Harrisburg, Pa.

Change of Address: Send old address (exactly as it appears on mailing label of your copy of magazine) and new address, including zone number, if any, to 1025 Phone: Sterling 3-5400

Vermont N. W., Washington, D. C. Allow two weeks for change-over.

Publishing Corporation: American Aviation Publications, Inc., Wayne W. Parrish, president; Leonard Elserer, vice-president and general manager; Albert H. Stackpole, Eric Bramley, vice presidents; E. J. Stackpole, Jr., secretary-treasurer.

American Aviation incorporates Airports and Air Carriers, Airports, Aviation Equipment, The American Pilot, Aviation Sales and Service, U. S. Aviation and American Airports. All rights to these names are reserved.

Cable: AMERAV

ADVERTISING OFFICES . . .

New York Office: Administration Building, LaGuardia Airport, New York, N. Y. Illinois 7-4100. Stephen R. Kent, director of advertising; A. B. Copeland, regional advertising manager; G. Mackenzie, sales promotion manager.

West Coast Office: Park Central Building, 412 West Sixth St., Los Angeles 14, Calif. Trinity 7997. Fred S. Hunter, manager.

Chicago Office: 139 North Clark St., Chicago 2, Ill. Central 6-5804. Bruce L. McGregor, regional advertising manager.

Foreign Advertising Representative: United Kingdom—Pearl Cooper Ltd., 2-3 Norfolk St., Strand, London, W. C. 2. Tel. Temple Bar 6111/2.

OTHER PUBLICATIONS . . .

American Aviation Daily, a daily news service for the entire industry. \$200 per year. Managing Editor: Keith Saunders.

American Aviation Directory: twice yearly listing of aircraft manufacturers, \$7.50 each. Managing Editor: Marion E. Grambow.

Official Airline Guide: Monthly publication of airline schedules and fares. \$11 per year in USA and countries belonging to Pan American Postal Union, including Spain and the Philippines. \$10 per year elsewhere. Published from 139 N. Clark St., Chicago 2, Ill. Central 6-5804. Managing Editor: Robert Parrish.

American Aviation Traffic News (incorporating Air Tariff Reports): Daily rates and tariff news. \$150 per year. Managing Editor: Wallace E. Longstreth.

When & Where

Feb. 12-13—National Aviation Education Council, Annual Meeting, Atlantic City, N. J.

Feb. 18—Instrument Society of America, New York Section, Statler Hotel, New York.

Mar. 11-13—Indiana-Ohio Joint Agricultural Aviation Conference, Purdue Univ., W. Lafayette, Ind.

Mar. 13—Institute of the Aeronautical Sciences, 8th Annual Flight Propulsion Meeting, Carter Hotel, Cleveland, Ohio.

Mar. 17-20—ATA Chief Pilots Meeting, Chicago.

Mar. 22-27—Congress of Aviation Organizations, Municipal Auditorium, Kansas City, Mo. (includes Airport Operators Council and AAAE, Mar. 23-26).

Mar. 23-27—8th Western Metal Exposition, Pan-Pacific Auditorium, and Western Metal Congress, Statler Hotel, Los Angeles.

Mar. 25-27—SAE Production Forum, Statler Hotel, Cleveland, Ohio.

Mar. 26—ATA Public Affairs Committee, Annual Meeting, Kansas City, Mo.

Mar. 27—National Association of State Aviation Officials, Board of Directors Meeting, Kansas City.

Mar. 31-Apr. 2—1st International Magnesium Exposition, National Guard Armory, Washington, D. C.

Apr. 20-24—SAE, Aeronautic & Aircraft Engineering Display, & Aircraft Production Forum, Hotel Governor Clinton, New York.

May 11-13—IRE National Conference on Airborne Electronics, Dayton Biltmore Hotel, Dayton, Ohio

May 18-22—5th National Materials Handling Exposition, Convention Hall, Philadelphia, Pa.

May 19-23—ATA Operations Conference (city and hotel to be announced).

May 19-23—Aviation Writers Association, Annual Convention, Dallas, Tex.

June 7-12—SAE, Summer Meeting, Ambassador & Ritz Carlton Hotels, Atlantic City, N. J.

International

Feb. 16—IATA, Ops Sub-Committee, 4th Meeting, Montreal.

Feb. 23—IATA, Technical Committee's Administrative Panel, Montreal.

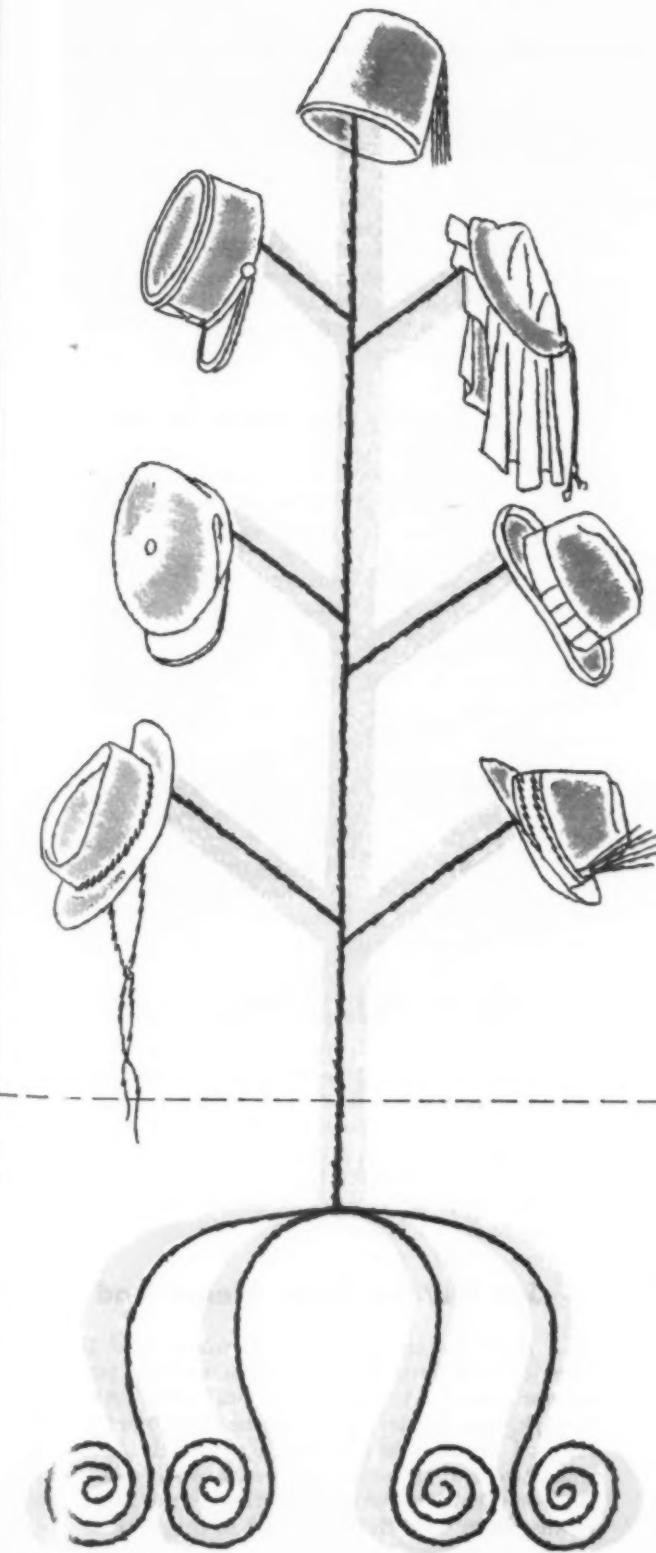
Feb. 24—ICAO, First Air Navigation Conference, Montreal.

Mar. 23—IATA, Medical Committee, 3rd Meeting, Estoril, Portugal.

Apr. 20—IATA, 6th Technical Conference, Puerto Rico.

June 16—ICAO Assembly, Brighton, England.

Oct. 10—International Air Race, England to Christchurch, New Zealand.



We hang our hat on this fact.
Airline and aircraft operators,
all over the world,
who fly millions of miles each year,
rely upon the dependability of Wilcox
Communication and Navigation Equipment
for safer flying, safer landings!

wilcox
ELECTRIC COMPANY, INC.

Fourteenth & Chestnut
Kansas City 27, Missouri, U.S.A.

Editorial

Railroads and Fly-Pasts

WE SECOND the motion of Arthur Godfrey that railroad stations be moved outside of the centers of cities. What with the Pennsylvania train plunging into Washington's Union Station the way it did, frightening innocent citizens all over the place, one never knows what a train is going to do these days. Definitely a hazard. Should never run those things anywhere near congested areas. Let's get those stations moved outside of town where all the trains might hit is a farmer's barn here and there and let the passengers come to town by limousine.

*by
W. W. P.*

And speaking of hazards, the Aircraft Owners and Pilots Association is knocking itself out with pride for having been the prime mover in forcing the Air Force to cancel its 460-plane fly-past as part of the inauguration ceremonies in Washington. We've never favored really close flying formations or marginal low-altitude displays, but we do think the hysterics over an aerial parade were just a little too, too sticky. If a well-planned and well-operated fly-past is to be hazardous, we might as well cut out about all the uses for airplanes. Just when is an airplane supposed to fly? Just when is the public ever to get a look at a spectacular air review? If AOPA will pardon us for saying so, we don't think it should be so bursting with pride for forcing cancellation of what should have been a prideful national demonstration of U. S. air power at a very timely point in American history.

All the Zest Gone?

The deadline for official entries in the England-to-Christchurch (New Zealand) 13,000 mile air race scheduled for next October has passed and neither the U. S. Air Force nor the Navy has entered an airplane. So anxious are the New Zealanders to have a top American participant that the judges might extend the entry date if our military will reconsider.

So depressing has been the atmosphere in Washington during the past year that top government men became afraid of their own shadows. We know that some of the Pentagon officials were skittish about Congressional criticism. Yet we believe that Congress and the public would actively support American participation in the race to demonstrate what our airplanes can do.

A B-36, for example, could fly the long route non-stop with extra fuel tanks. And the Navy's P2V Neptune, fitted with Wright Turbo-Compound engines, could do likewise, since a P2V-1 now holds

the distance record, 11,229 miles, from Perth, Australia, to Columbus, Ohio. At a time when the U. S. is trying to exploit the long range and speed characteristics of global defense, here is a golden opportunity for world attention. It may not be too late for the incoming Secretary of the Air Force, Harold Talbott, to re-open the matter and ask the New Zealand race committee for an extension. Has all of the imagination, promotion, and zest gone from the U. S. for good? We hope not.

Lord Byron, the CAA, Et Al

When Lord Byron said "The best of prophets of the future is the past" he certainly wasn't dreaming about aviation, and especially not about the future development of air cargo. We now have three forecasts for air cargo tonnage for the year 1960 and the variation is something to behold. The CAA has just estimated that 700 million ton-miles of freight and express will be carried annually by domestic airlines by 1960. Both Lockheed and Douglas have forecast volumes of over one billion ton-miles by the same year.

Pity the poor airline economist who is supposed to guide management in its equipment decisions when faced with a forecast differential of 300 million ton-miles. Of course the difference of opinion revolves around costs. The CAA anticipates that the present rate of about 20 cents per ton-mile won't vary appreciably by 1960, whereas Douglas, for example, assumes freight costs will go down to 12 cents per ton-mile.

Forecasting aviation's future is a hazardous business when you get specific. We prefer to play safe. We just think air cargo is going to continue to increase at a ratio dependent upon the amount of hard work and sales effort devoted to it. Until more people who call the shots are themselves convinced of air cargo's potential, and really get down to pushing air cargo, forecasting is more risky than election polls. Air cargo won't grow by itself, any more than did passenger air travel.

Jot This on Your Memo Pad

If you are trying to estimate when the U. S. will have jet transports in commercial service, put this on your memo pad. Our international editor, Anthony Vandyk, has pointed out that the jet Comet I took five and a half years to develop. Exactly the same time—two and three-fourths years—was taken from the time the basic design was settled to the first flight, as was taken from the first flight to the start of fare-paying operational service.

... WAYNE W. PARRISH

AMERICAN AVIATION



THE DOVE *For the executive - an airliner in miniature*

Elegance with efficiency and economy

In extensive service in U.S.A. and forty other countries.

Range 1,500 statute miles at economical cruising speed,
making 1,000-mile stages a practical operation.

DE HAVILLAND
OF HATFIELD, ENGLAND

Builders of the Comet, the world's first jet airliner

Factories in England, North America and Australia.
Distributing and servicing organisation throughout
the free world.

Factory-scale overhaul, servicing and spare parts
facilities are available in U.S.A. for the Dove
airframe, engine and propellers.

De Havilland representative in U.S.A., Linden Airport, New Jersey. Telephone: Linden 3-3530. Telegrams: Havilland, Linden, N.J.

B.F. Goodrich



B. F. Goodrich high-speed tire lands 1238 mph Skyrocket

NAVY'S DOUGLAS SKYROCKET has flown faster than any other piloted aircraft. Announced speed record: 1238 miles per hour.

Bringing it down to earth called for tires with giant strength. They had to be small to retract into close space in the fuselage. And strong to take an impact load of 8 tons, resist the terrific heat of 200 mph landings.

Other makers of tires had failed to meet specifications for this assignment. B. F. Goodrich engineers came up with both nose and main wheel tires that

have even given more landings than required. They cushion the landing impact with 200 lbs. air pressure, yet main wheel tires are only 24" high, 5½" wide. Nosewheel tires are 20" high, less than 4½" wide.

These tiny tires are typical of BFG's long record of engineering development on high pressure airplane tires—from the first high pressure tires for Navy carrier landings about 24 years ago to the new, revolutionary high-speed tire that lands planes at 250 mph. The first low pressure airplane tire was

also a B. F. Goodrich development.

Other BFG products for aviation include wheels and brakes, De-icers, heated rubber, Avtrim, Plastilock adhesives, Pressure Sealing Zippers, inflatable seals, fuel cells, Rivnuts, accessories. *The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.*

B.F. Goodrich
FIRST IN RUBBER

AMERICAN AVIATION



PAN AMERICAN order for Comet III's (above) depends on certification.

CAA Drafts Comet Certification Timetable

Engineering team puts final touches to plan of action as British group arrives for talks.

By JOSEPH S. MURPHY

THE CAA moved headlong into the problem of certificating jet transports for use by U. S. operators with two major developments highlighting the past weeks' activities:

* A team of four men representing the British Air Registration Board arrived in Washington for "informal discussions" on jet certification problems in general and on the Comet and Viscount certification problems in particular. The team is headed by R. E. Hardingham, chief executive of the ARB, and includes power plant, flight test and structures specialists R. H. Ward, H. C. Black, and J. G. M. Pardoe.

CAA Administrator Charles F. Horne formally approved a seven-point program which will guide the work of the Jet Transport Evaluation Team. The team, headed by George Haldeman who

has been borrowed from his regular post as chief of CAA's aircraft engineering division to head up this team, will prove a key organization in CAA/airline/manufacturer relations in the next two years, regardless of administrative changes in higher Commerce positions.

In theory the two developments are not related. Haldeman has been working up his program for two months since the formation of his evaluation team in November. But actually a strong relationship does exist. Hardingham and his team are in this country at the insistence of the U. S. State Department, which worked with the British in getting Horne to try to accelerate jet certification in this country.

Why? Specifically de Havilland and the British Government are worried about meeting the terms of the Pan American World Airways order for three de Havilland Comets, with option for seven more. The British consider

the order of extreme importance, far above the direct dollar implications.

But the PAA contract carries specific clauses which could wipe out the order if the Comet is not certificated by CAA, or, more significantly, if de Havilland does not establish, to Pan American's satisfaction, that the arrangements are being made as rapidly as possible and "in good faith."

The British representatives are not expected to be pleased when they see the CAA program, which stretches over a long period. But it was set up to meet U. S. requirements, not to satisfy the requirements of Comet certification. The British are going to want a specific program for Comet certification. How much of ARB testing will be accepted, how much testing will have to be done in this country by CAA's people, to what extent will our present ICAO commitments be respected in the matter of turbine-powered aircraft certification.

CAA is not prepared to answer these questions. Instead the British will be shown this country's program (one phase calls for a visit to England in August, 1953). In theory, since the Comet III which PAA ordered is not



CAA JET TRANSPORT TEAM appointed in November, 1952, pictured meeting for first time. Standing (l. to r.) Melton, Hoekstra, Meyersburg, Peterson, Auburn, Gaines, and Haldeman, group chairman. Seated are Springer, Gray and Yagiela; team members not shown are Hawks and Gates.

These Men Will Guide U. S. Jet Certification

Selected by Charles Horne for the jet evaluation team were six members from CAA's Washington staff, five from its field office in Region Six at Los Angeles and one from Region Seven in Seattle.

Director of the group, **George W. Haldeman**, pilot and head of the type certification board that approved the Boeing 314, 307, and 377, the Douglas DC-6, Convair 240, and Lockheed Constellation. On temporary leave from his post as chief of aircraft engineering division, Haldeman is in his 17th year with CAA.

Harold D. Hoekstra, pilot and engineer with CAA since 1937, and more recently assistant director for prototype aircraft development and chairman of the CAA foreign survey group of the prototype aircraft advisory committee.

Robert J. Auburn, pilot and engineer with CAA since 1937, comes to the jet team from the top post in the power plant installation branch of CAA's aircraft engineering division.

Robert F. Gates, with CAA since 1945, ex-USAF pilot and qualified on the four-jet North American B-45, was assigned from his post as acting chief of CAA's special operations branch.

Robert B. Meyersburg joined CAA in 1946. Before his assignment to the jet team he held the post of deputy chief of CAA flight test branch. A pilot, Meyersburg has previously served as advisor to the U. S. airworthiness delegation to ICAO.

Burdell L. Springer, with CAA since 1937 and for the past six years deputy chief of airframe and equipment branch, presented U. S. views to ICAO on high speed, high altitude air-

craft. He comes to the team as structural specialist.

Charles R. Hawks, top man in the jet team's field group, was deputy to Haldeman in certification work. Now in USAF as lieutenant colonel working with turbine-powered aircraft, Hawks is expected to join the team in April.

W. E. Gray, chief of CAA's aircraft engineering branch, Sixth Region, and qualified B-45 pilot, joined CAA from an NACA post as engineering test pilot. In the Sixth Region he has been associated with the flight testing of Convair 240's and 340's and Douglas DC-6's.

Stanley Yagiela, chief of the Sixth Region airframe and equipment section and specialist in aircraft structures, was formerly a member of the NACA aircraft structural materials committee.

Floyd T. Melton joined CAA from the Boeing Airplane Company in 1943 and is now chief of the Sixth Region powerplant branch. CAA work has involved large projects including that of CAA representative on powerplant programs related to civil certification of military equipment.

Benjamin R. Gaines, engineer with the Sixth Region, has been with CAA for fifteen years; he joins the team as electronics and electrical specialist. He also served with the CAA airways division on the installation and operation of electronics-electrical equipment.

Roy C. Peterson, with CAA for the past six years and now acting chief of Seventh Region aircraft engineering branch in Seattle, has been closely concerned with Boeing Airplane Company jet transport planning.

due for delivery until 1956, this schedule would meet British needs. But the big question still remains: "Will it meet the PAA de Havilland contract requirements?"

In the light of these developments the CAA program, previously undisclosed, becomes important. Equally important is the background and leanings of the group which will comprise the evaluation team. Here are the facts:

* **First step** calls for a review of previously proposed CAA jet transport data, the Air Transport Association's specification for jet transports, procurement and review of other data originating from the National Advisory Committee for Aeronautics, the military services, ICAO, experimental laboratories and manufacturers, both foreign and domestic.

* **Next** comes meetings with NACA, experimental laboratories, aircraft, engine and accessory manufacturers, and the military services in the U. S. to open avenues for detailed and current information.

* **And then, meetings** with similar functions in Canada and Europe, in this case to include operators of jet transports, the British Air Registration Board, Ministry of Supply, Ministry of Civil Aviation, and in France the Secretariat General de l'Aviation.

Phase one of the team schedule will bring up to date CAA's Proposed Policies on Airworthiness Requirements for Certification of Turbine Powered Transport Airplanes," dated January, 1952, and review the ATA specification of September, 1952. Haldeman's timetable calls for its completion in the latter part of March, calling for daily meetings of the six-man Washington staff to identify each problem anticipated in certifying and operating a jet transport.

Although focusing its energies on those relating to airframe, powerplants and accessories, flight testing and operational aspects, meetings with other CAA offices will provide a "preliminary understanding" of such related fields as: (1) communications facilities; (2) electrical and electronic equipment; (3) navigational aids; (4) airport construction; runway requirements, etc.; and (5) airways operations.

Phase two will bring together the Washington and field segments of the team for a two-week review of the preceding phase, to consider and agree upon the need for continuing studies which would be requested of other CAA offices if found necessary.

Phase three schedules meetings with NACA, the experimental laboratories, manufacturers and the military services,

including operating units. Proposed over a ten-week period terminating in late June, this phase will bring the team to the detailed problems of jet transports. Along with the aircraft and engine manufacturers on the schedule will be component manufacturers of such equipment as tires, wheels, brakes, hydraulic accessories, radio, electrical, and electronic items.

Phase four, ending in mid-July, calls for further meetings with various CAA offices in Washington to review the information, results, and conclusions obtained at the time, and will bring forth an interim report of the group's tentative findings and recommendations.

Phase five brings to the group the experience of foreign agencies, manufacturers, and operators, with meetings proposed over an eight-week period ending in mid-September. Here the concentration can be expected to center on the wealth of experience to be gained from sources in Great Britain related to the scheduled airline operation of Comet aircraft. The team or its appropriate members will meet with counterparts of those U.S. agencies visited in phase three and will undertake "a considerable amount of essential preparation" for the foreign visits, to obtain the maximum benefit from these sources.

Phase six will round out the 1953 schedule, ending with the preparation of a report recommending jet transport certification and operations standards. Some will be in the form of "criteria of the Administrator," such as the manual material accompanying present Civil Air Regulations. Others will become CAA recommendations to the Civil Aeronautics Board for specific changes to Civil Air Regulations.

Assuming that there will remain problems of certification and operation of the jets still unsolved, the group will recommend an approach to their possible solution. Still to be learned will be the lessons of actual type certification tests, and the evaluation team as a whole or those segments needed will be retained on a continuing basis until type tests are completed on at least the first U.S. constructed jet transport.

Phase seven, of indefinite scheduling, depends on approval of an expected CAA budget proposal of \$1.6 million for fiscal 1954 to carry out the prototype testing law, involving tests of the Avro Jetliner, the Allison Turbo-Liner, and two Navy Douglas F3D fighters.

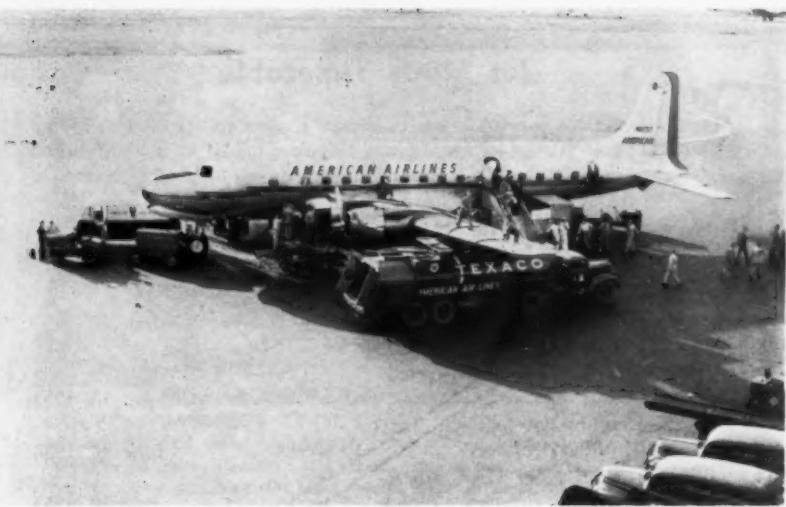
Jet Study Timetable

Timetable for CAA Jet Transport Evaluation Team extends to November, 1953, but some members will be retained until certification tests are completed on "at least the first U.S.-constructed prototype jet transport."

Activity	Duration	Estimated Completion Date
Review of data previously proposed, ATA specification for jet transport, etc.	3 months.....	March 27, 1953
Meeting of Washington and field members to discuss completed phase I	2 weeks	April 13, 1953
Meetings with NACA, manufacturers, military services	10 weeks	June 22, 1953
Meetings with other CAA offices and preparation of interim report	4 weeks	July 19, 1953
Meetings with foreign manufacturers, operators, etc.	8 weeks ..	September 14, 1953
Final review and report of activities, recommendation standards	8 weeks ..	November 16, 1953
Participation in prototype testing program	Unknown—dependent on Congressional action.	
Participation in actual certification tests	Unknown—awaiting first U. S.-constructed jet transport.	



Ike's new plane, new pilot. The familiar Douglas DC-6 Independence, which served as President Truman's plane, is slated for relegation to obscurity while a Lockheed C-121 Constellation takes over as the official White House mode of transportation. The Independence, which carries the USAF designation C-118, will be replaced by C-121 No. 8610, the plane which carried President Eisenhower to Korea (Ike also used a C-121 during his tour as Supreme Commander, Allied Headquarters in Europe). The Independence will be assigned to the Air Force's Special Air Mission fleet. No. 8610 was formerly used by ex-Secretary of the Air Force Thomas K. Finletter and other top USAF brass. Pilot will be Maj. William G. Draper, who has been Eisenhower's personal pilot since 1942. Draper will double as the President's Air Force aide.



Instead of Cluttered Ramps . . .



. . . Safety & Simplicity With Avomat

By FRED HUNTER

LOKEED Air Terminal is putting final engineering touches to an integrated ramp service system incorporating automatic features and geared to streamline airline ground operations at large terminal airports.

Money-saving economies claimed for the new system, called Avomat, include:

- Less ground equipment;
- Fewer ramp personnel;
- Fewer ground maintenance personnel;
- Faster turn-arounds;
- Greater aircraft utilization.

"Tremendous airline progress has been made in the air," says L. W. Wulfkuhler, manager of the Burbank, Calif., terminal. "Now we are shooting for similar improvement on the ground."

The newly designed ramp system revolves around an improved pit fueling system developed by the Lockheed terminal's staff, together with equipment manufacturers, after a complete survey study covering every large United States airport, including those at Honolulu and San Juan.

The system calls for clearing the ramp of battery carts, rectifiers, air conditioning units and similar loose equipment by going underground with a permanently installed 28.5 volt aircraft power supply, heaters, air conditioners, and even a waste disposal system to simplify disposition of the well and unfavorably known honey bucket.

This will leave the stair-step ramps for passengers, the baggage carts, and the commissary trucks as about the only obstacles remaining to take up surface space on the ramps.

Eventually, the Lockheed terminal's engineers envision overhead or underground transfer of passengers between terminal building and aircraft, thus freeing the ramps of passengers, too.

The new ramp system will be made available for use by airlines at other airports on a use-rental contract basis. A new company, Avomat, Inc., has been formed to act as licensee of Lockheed Air Terminal, Inc., in marketing and installing it.

The name Avomat is derived from "aviation" and "automatic." President of Avomat is Frank Der Yuen, who is widely known in the aviation industry, particularly for his work during the last three years as consultant to Aeronautical Radio, Inc., and to Northwest Airlines in the development of its fixed fueling system for its Stratocruisers.

Marketing plans call for Avomat to supply the capital investment and the service maintenance of an installation. Operation would be by the lessee. Although rental would be based primarily on a gallonage charge on the fuel put through the dispensary system, airlines will retain their own choice of supplier and their contracts for petroleum products will be unaffected.

Airports will benefit from increased ramp space, less ramp maintenance, continuous fuel supply, greater gate utilization and airport supporting revenue.

Increasing Costs

Ramp equipment costs keep increasing. Air conditioning units, which formerly cost \$16,000, for example, are now up to \$22,000 each. This is a sample of substantial capital investment which airlines would be able to avoid by contracting for the Avomat system.

One of the larger carriers recently calculated that its investment in ramp equipment averaged out at approximately \$70,000 per airport, a very respectable sum considering that this included smaller airports requiring a minimum of equipment.

After an initial period for amortization, which might be put at five years, Avomat reports that preliminary studies indicate the gallonage charge at most big airports would be so low that very substantial savings on into-plane costs would be certain to accrue to the operator.

One of the strong points of the Avomat system is the inclusion of an automatic CO₂ system for all pits. Another is a metering system employing a printed record of each fueling.

In addition to the automatic fire extinguishing system and the printed record meter, special features of the Avomat system include positive water separation, positive air elimination, a ramp control signal system, a visual



PIT METER keeps record of fuel supplied.

storage tank gauge, lightweight hoses, both overwing and underwing fueling, positive gear-driven hose rewind, easy-to-open heavy-duty pit doors, pit door safety control valves, and fully coated fuel contact surfaces.

The pit doors, flush to the surface of the ramp, are stressed to carry a wheel load of 100,000 pounds, or more than enough to withstand a fully loaded Boeing Stratocruiser if it should by chance happen to come to a stop on one of the doors.

A pilot installation of the Avomat system is now in process at Lockheed Air Terminal. First pit fueling unit is in operation and tests have been run on fueling both Constellation and DC-6 equipment. A 750-amp. generator, built to Lockheed specifications to provide the 28.5-volt aircraft power supply, is ready for the start of tests. Specifications call for an adequate overload to allow for any possible excessive power demand for engine starting.

The pit fueling installation at the Burbank airport includes a 25,000-gallon underground tank, a 40-hp electric drive turbine pump, a water separator, and a six-inch line providing a continuous supply of 100-octane gas at a maximum flow of 800 gallons per minute. Lockheed has only one gate position in operation during the current testing period. However, four gate positions may be operated simultaneously without any additional pump facilities.

Pit fueling of itself is not a new development. Pits have been in operation at Washington International for some time, the new Pittsburgh airport has them, and an elaborate installation is planned at the new Fort Worth airport.

The Avomat system, however, incorporates safety and operational improvements and also includes other vital ramp services to expedite the ground operations of airlines at key terminals.

News Briefs

PEOPLE

Former USAF Secretary Stuart W. Symington, now a senator, has been assigned to the Armed Services Committee as a minority member.

The Assistant Navy Secretary for Air, John F. Floberg, has been asked to explain a report that he was "disclosing classified material." Source of the charge: Sen. Joseph R. McCarthy (R., Wis.).

New executive assistant to the vice president-sales for Canadair, Limited, is Alexander J. Lilly, chief test pilot for Canadair since 1946 and first Canadian to fly faster than sound.

An aircraft that will take off vertically is in Lockheed's plans for the future, according to Hal L. Hibbard, vice president-engineering. Exact date will depend upon when the demand for military aircraft slackens.

The president of California Central Airlines, Col. C. C. Sherman, sees the future as holding inevitable boosts in airline fares, both coach and first class. His prediction followed rather closely an announcement that the California Public Utilities Commission had approved new tariffs filed by United Air Lines, Western Air Lines, and Trans World Airlines, who thereby followed CCA's lead of last June, at which time the intrastate carrier raised prices on its San Francisco-Los Angeles run.

One of the men who, it is understood, will help screen candidates for government positions is the former head of a non-scheduled airline, Charles F. Willis, Jr. Willis, once head of Willis Air Service, Inc., which unsuccessfully sought an all-cargo certificate, has been named assistant to Sherman Adams, who is President Eisenhower's principal White House assistant.

A long-time lobbyist for separation of air mail pay and subsidy, Langdon P. Marvin, Jr., has been named legislative assistant to Sen. John Kennedy (D., Mass.). Marvin has drawn a considerable part of his support in the campaign for separation from people and organizations located in Massachusetts since Kennedy appointed him a consultant on air transport in 1948.

GENERAL AVIATION

The National Air Museum is down for half a million dollars in the fiscal 1954 budget as submitted by President Truman. Museum was approved by Congress in 1946, but progress since then has been by nickels and dimes. Storage facility at Suitland, Md., is scheduled for completion this year.

Personal and executive aircraft shipped in November of last year totaled 222, and were worth \$1.8 million. Eleven-month totals thus reached 2,849 planes and some \$24 million.

GOVERNMENT

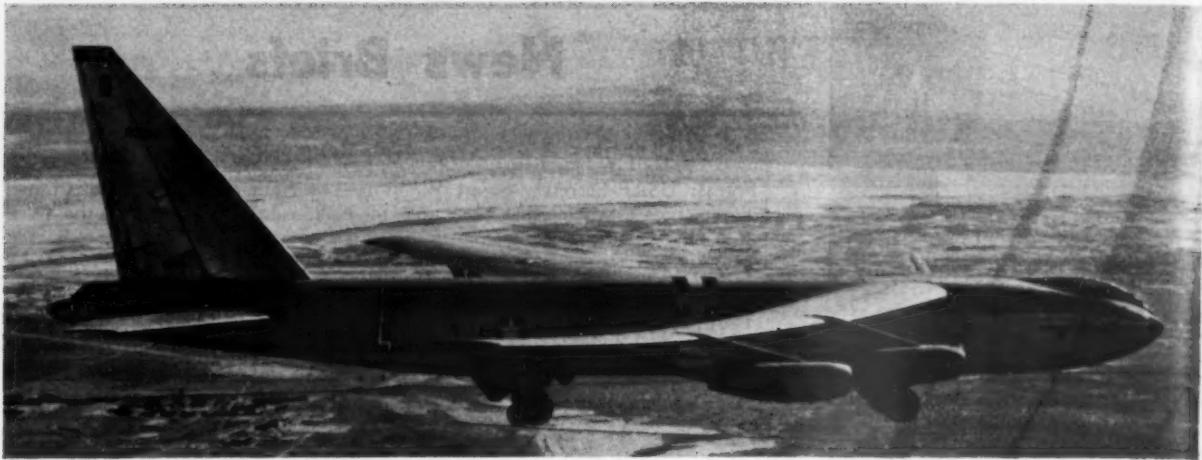
The split of All-American Airways into Allegheny Airlines and All American Engineering and Research Corp. has been approved by the Civil Aeronautics Board.

In the closing days of his Administration, President Truman asked Congress for \$2.3 billion in supplemental appropriations for aviation, including \$4.6 million to CAA for the establishment of air navigation facilities and \$3.5 for the Federal airport program.

Despite the fact that it has almost doubled its work force since the outbreak of the war in Korea, Pratt & Whitney Aircraft Division will, within the next few months, need to add another 5,000 employees to its payroll.

On the Cover

Leslie O. Barnes, better known as "Les," has been named director of operations for Allegheny Airlines (formerly All-American Airways). Barnes, who started his aviation career in 1937 with American Airlines, has been director of operations for the Air Transport Association for the past few years. Prior to taking up his new duties with Allegheny on February 1, he was on leave from ATA, serving as executive director of the National Air Transport Coordinating Committee in New York. Prior to his association with ATA he served with CAA as chief of the Air Traffic Control Center for Chicago and the traffic control section of the CAA's Third Region.



Flapping its wings, apparently, is this Boeing XB-52, photographed as it ended its first cross-country flight at the Air Force Flight Test Center, Edwards, California. Appearance of curved wing results from the angle of vision, atmospheric conditions, and normal amount of wing tip flexing.



Leaving home, a North American Aviation FJ-2 Fury is frozen by the camera just as it is about to clear the edge of the USS Coral Sea via catapult.

Setting Down ... Setting Off

A Viking sets sail. High altitude rocket built by Glenn L. Martin Co. for the Naval Research Laboratory takes off, leaving behind it on the ground a cloud of steam, vaporized water from the pit beneath the launching stand. Nine 42-foot Vikings have been built by Martin, which has received an order for four more.





Carter



Oelschlager



Burstein

CAB's 'G-Men' Police Nation's Airlines

This 14-man unit qualifies as smallest law enforcement bureau with the most difficult beat.

By WILLIAM V. HENZEY

THOSE of the 3,000 or more companies under the jurisdiction of the Civil Aeronautics Board who may violate or desire to violate the economic provision of the Civil Aeronautics Act, should, on the surface, have little to fear in the way of getting caught. In fact, only six men with the world as their beat are paid by Uncle Sam to investigate infractions of the air law.

Add eight attorneys and seven clerical people and you have probably the smallest law enforcement bureau with the largest and most difficult beat on the globe. But don't underestimate this group. It handles an average of 200 cases a year. It always wins. Officially, it is known as CAB's Office of Enforcement.

CAB has three principal functions—safety, economics, and enforcement. It has separate units within the Board to deal with each. The Office of Enforcement is the smallest of these.

Through the early stages of aviation development, major emphasis in the Board had been placed on safety and economics. Now, the need for enforcing the provisions of the Act (and the fallacy of not having a strict enforcement program earlier) is getting close attention at CAB.

The enforcement office is headed by a former North Carolina judge who was top legal member of the Air Transport Command during the war—Oliver Carter.

It is perhaps significant to note that CAB did not recognize enforcement work as a separate activity until 1946—the year Carter left the armed services and joined CAB. From the creation of the Board by act of Congress in 1938 until 1946, enforcement was practically unheard of in air circles.

During that period in 1946, the air industry was rocking under the impetus of the non-scheduled airlines' entry into the field. Aware of the need for policing action, CAB set up what was then called the Enforcement and Litigation Section of the Bureau of Law (General Counsel's Office). It was a three man unit headed by H. Don Reynolds (now a Pan American World Airways attorney), Carter, and Oral D. Ozment (currently a member of CAB's General Counsel's Office).

The work of this group led CAB, partially at least, to recognize the need for an individual office, answerable directly to it, to police the swelling air industry that for the previous decade had had virtually no policing. On December 15, 1948, such an office was officially established—with Carter as chief.

With its creation synonymous with the advent of the non-sched, the enforcement office has often been on the receiving end of unjust criticism as the foe of the non-scheduled carrier.

But the air is cleared for many by Carter's comparison of his duties and those of his staff with the lot of the corner policemen. Says Carter: The policeman did not put the traffic light there and cannot take it down; all he can do is see that it is obeyed.

Similarly, CAB's enforcement office is not a policy-making group. Like any police outfit, it can only see that the law is obeyed. Its activities are wholly apart from the policy functions of CAB. It does not pass on the rates in an airline's tariffs or specify what reports must be filed, but it sees that the airline lives up to its published tariffs and that the proper reports are filed.

Violations of the Act are discovered in many different ways. Many are

turned up by the investigators, who submit themselves to abuses of which the public may have complained, or who conduct spot checks or audits of airline companies' books. Others are turned up by close scrutiny of reports filed with the Board periodically. Still others develop from formal or informal complaints; in some cases, anonymous tips.

The investigators, in effect, are the "G-Men" of aviation. Their work is dangerous, sometimes pathetic, sometimes humorous. Several investigators have been "shadowed" while conducting investigations in the Harlem district of New York.

At one time they were called in in New York when certain persons, believed to be rival ticket agents, were breaking into the offices of Puerto Rican ticket agents and playing havoc by damaging baggage of passengers, breaking typewriters and other office equipment, and overturning files, desks, and tables. In another case, they investigated charges that an air freight forwarder was controlled by a gang of fur thieves.

A report that an all-cargo carrier was transporting a passenger on a flight that ended in a crash was exploded when it was learned that the extra body found in the wreckage was that of a corpse being carried as part of the cargo.

Group Functions

But the functions of this group, as outlined in the official CAB manual, read essentially like this:

- To initiate, plan, and conduct investigations of alleged violations of the economic provisions of the Act and the Board's requirements thereunder.

- To accomplish economic enforcement by informal action, whenever appropriate by affording offenders an opportunity voluntarily to achieve and demonstrate compliance; and to take such action, and effect such arrangements and understanding, as may be appropriate and necessary to bring about compliance in such cases.

- To negotiate, execute, and accept, subject to Board approval, formal stipulations and other consent agreements in appropriate cases to cease and desist from violations, or to recommend to the Board the entry of appropriate compliance orders.

- To prepare and present before the Board and its examiners the Government's case in formal economic enforcement proceedings.

- To institute and prosecute, in the proper courts, as agent of the Board, all civil and criminal actions and proceedings for economic enforcement, and to handle all appeals in such cases.

That is the framework which should produce a healthy contribution to the orderly development of air transportation. In recent years, the panel of Board members has come to recognize this.

In early years, according to long-time CAB people, the Board had "pampered" the growing industry. But developments, not only with non-scheduled airlines but in the certified industry as well, have proved continuation of such a policy, even at this stage of steady growth, would be unwise.

This should not sound alarming. On the contrary, one official says, a greater sense of security stems from increased vigilance of the local police force or an increase in the number of policemen, and so it should be in the aviation world.

Things to Come

These things can be looked for from the enforcement office from here on:

- **Major emphasis** on reporting requirements, a hitherto lightly treated but highly important phase of the regulatory process.
- **Continued close scrutiny** of tariff practices, possible discriminations, and unfair competitive practices.
- **Continued efforts** to curb unauthorized practices of non-scheduled airlines.
- **Greater emphasis** on unscrupulous practices of some ticket agents.

Talking with Carter, and two of his top staff people, Frank Oelschlager and Robert Burstein, you get the impression that the industry owes it to itself to report accurately to the Board the financial and other data required by law. From these reports, Board reasoning on mail rates, passenger and cargo fares, and other highly important matters, is formed.

Where subsidy is involved, the matter is of even greater importance. If a carrier purposely falsifies reports, the taxpayer's money is doled out unfairly. Or, if because of a not-too-strict policy in the past, CAB has permitted somewhat shoddy reporting practices, the Board, through a lack of confidence in the carrier's reports, may arbitrarily arrive at a mail rate that would prove unfair and inadequate for the carrier.

The impetus for a tighter policy on reporting requirements was furnished by a case against a certificated carrier two years ago when it was determined the carrier had falsified its reports for years. A swift enforcement case, the practice was stopped, and the taxpayers were saved and still are being saved about \$250,000 a year.

The aim of the enforcement section is not to alarm or to prosecute whole-

sale. Rather, as Carter puts it, the aim is to promote efficiency. On the charity-begins-at-home theory, he has promoted a notable step toward more efficient functioning within the Board in the matter of enforcement.

Until recently, an enforcement case was started by CAB's issuance of a formal order which directed a party to show cause why it should not be punished for various alleged violations as outlined in the order. The apparent weakness in this, from the standpoint of justice, was that the Board was practically convinced of the enforcement office's arguments before it issued such an order.

Now, if grounds for an enforcement action are developed, a member of the enforcement office registers a complaint. Carter, as chief, then adds to the complaint a petition instituting enforcement action and the document is filed in CAB's docket section. In this way, the five-man panel of CAB members, which will be called on to act as judge and jury eventually, is not influenced one way or the other before a full set of facts, from both sides, are developed.

The Board, of course, can issue a show cause order on its own initiative, but the number of such instances has been greatly minimized.

Violators who have been found guilty may be punished in various ways, depending upon the degree of their violations.

Voluntary Compliance

In about one-fourth of the cases, voluntary compliance is acquired without any formal process. In others, "cease and desist" orders are issued; coming from CAB these have the same effect as a "stay order" or "injunction" issued by the courts. In more severe cases, a carrier's license to operate may be suspended or, at the furthest extreme, revoked. Where the violations assume criminal aspects, civil court action and fines may also result.

The CAB enforcement office is not out to "get" the non-skeds, as is so often implied. It is out to get violators of the Act to comply with the Act. Since 1946, non-skeds have been the greatest violators, numerically speaking. But in the past two years, the less numerous certificated carriers have seen the managements of two of their number change hands as the direct result of enforcement actions.

Various freight forwarders, foreign air carriers, and now ticket agents also give the CAB work in this field. With continued recognition of this work by the Board members, the enforcement office may eventually achieve its proper position in the strata of CAB functions.

UAL's 'Safety Seating'

Still Under Fire

The United Air Lines DC-4 coach controversy continued at a simmering pace through January with these new developments:

• On January 10 was made public a CAB wire to United which called for compliance with CAB terms by January 16. Essentially, these terms were that United would discontinue the practice of selling only 54 seats on DC-4 coach aircraft.

• On January 13, United asked CAB to review a decision made by Air Operations Bureau Chief Gordon M. Bain which denied short-notice authority to file a tariff setting 54 seats as the maximum for United DC-4 coach fares. United's effective tariff specified a 64-seat minimum.

• On January 12, American Airlines asked for authority to operate 80-passenger DC-6 coaches non-stop between Oakland/San Francisco and Chicago, a major segment of United's transcontinental route.

• On January 12, Air America, a large irregular carrier, asked for an exemption to operate two daily transcontinental coach flights over United's main route.

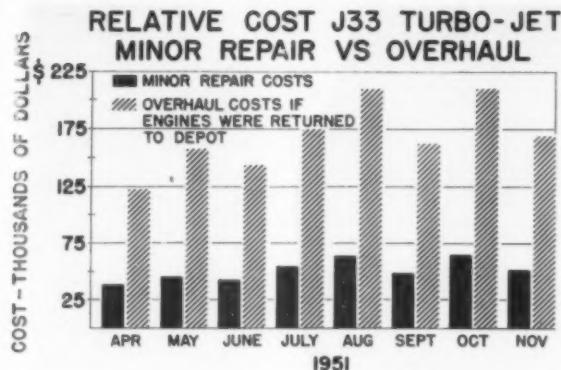
• On January 16, CAB informally granted an extension of the "compliance" date to January 21.

• On January 19, United asked CAB to reconsider its order to discontinue the 54-seat coach practice and to grant public hearings.

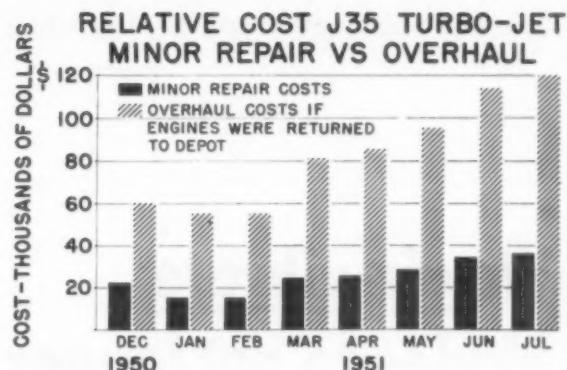
• On January 21, United announced plans to begin 72-passenger DC-6 coach operations with two round trips daily between Oakland/San Francisco, Chicago, and New York, on or before April 26. These would be in addition to DC-4 coach services, the company said.

• On January 21, North American Airlines, a large irregular, asked for authority to begin "immediate coach operations" over United's route, claiming it had "at least five DC-4's" available for the service.

• On January 21, Eastern Air Lines asked CAB to deny United's tariff proposals in connection with the DC-4 coach problem, claiming "more exits and not less seating" is the answer to United's problem. Eastern also attacked CAB policy insofar as it sets a 68-seat minimum for DC-6 coaches. Said Eastern: This is too low for DC-6's and gives operators of those planes an advantage over Constellation and DC-4 coach operators whose minimums, according to CAB, are 79 and 64 seats, respectively.



EIGHT MONTH STUDY by Allison reveals the cost differences in minor repair and overhaul of centrifugal J33 engine.



AXIAL FLOW ENGINES (Allison J35) show these repair-overhaul cost variations. Minor repair costs about 30% of overhaul cost, including labor and materials.

Engineers Explore Jet Engine Economics

Annual meeting of SAE adds up recent experience, points way to money-making operations.

THE BIGGEST single problem facing the airlines, aircraft manufacturers, and engine manufacturers looking toward the commercial operation of turbine powered transports is the economics of the jet engine itself. In a high level symposium sponsored by the Society of Automotive Engineers in Detroit recently, some 150 industry members were given a close look at the major factors affecting these economics:

- **Direct operating costs.** The jet airplane is most sensitive to engine design variables—a 10% increase in specific fuel consumption will result in a five per cent increase in direct operating costs.
- **Operational techniques** could provide the answer to satisfying military combat design requirements and at the same time could produce a power plant that would meet the cost-conscious civil industry needs.
- **Extended overhaul periods** can be reached by applying minor repair procedures in line maintenance with reduction in operating costs, but engine design must permit them.
- **Fuel costs**, now representing a major part of airline direct operating costs, are slated to rise some 33½% in jet operations; new fuels may dictate employment of fuel technicians to minimize this expense. In any event, better fuel identification system is needed to permit intelligent purchasing.

The setting for the SAE session was Detroit's Sheraton-Cadillac Hotel; the occasion, the engineering society's

annual meeting and engineering display, with an aviation calendar extending from January 14 through the 16th.

Best explanation of the need for a discussion on the subject came from panel chairman Allen Dallas, director of engineering for the Air Transport Association, who told of ATA's recent specification for a jet transport aircraft and the scarcity of items (there were two) that it included on jet engines, despite the common knowledge that engine costs represent such a large portion of airline operating expense.

Staffed with experts from among the country's leading jet aircraft and engine manufacturers, the SAE panel included representatives from:

Boeing Airplane (building the U. S. its first jet transport, with a prototype scheduled to fly in 1954): J. E. Steiner discussing the relationship of engine design to airplane operating cost.

Pratt & Whitney (its J57 engine selected by three aircraft manufacturers on their commercial jet transport proposals): P. D. Doran urging early recognition of some jet fuel problems.

General Electric (operating a four-jet North American B-45 on simulated airline tests with an airline flight crew for the past two years, and studying the potential of a commercial jet engine market): R. T. Holland offering some solutions to the problem of achieving compatibility in military and civil engine design characteristics.

Allison-General Motors (past the 2.5 million hour mark in jet engine

flying experience and operator of the only U. S. commercial turboprop airplane, the Turbo-Liner): C. E. Dixon contributing some answers on extended engine overhaul times.

Curtiss-Wright (aiming at the commercial market with its foreign-designed Sapphire and J67 Olympus engines): M. W. Galliers stressing some all-important maintenance aspects in designing a jet engine.

• It is generally more advantageous to use an engine with a low fuel consumption, even if the engine weight is slightly higher, than a very light engine with a higher fuel consumption, Boeing's J. E. Steiner told the group. Steiner discussed the relative effects of engine design variables on the operating cost of commercial airplanes, and supported these general conclusions:

Increase in drag, fuel consumption, or engine weight will reduce range. The range can be recovered by increasing take-off weight; however, if a performance factor such as take-off field length is critical at take-off weight, the recovery may require large increases in thrust.

If engine weight is increased and range is regained by increasing take-off weight, the increase will be several times the engine weight increase.

An example offered by Steiner: A fairly heavily loaded airplane weighing 175,000 pounds is designed with a primary range of Chicago to San Francisco under strong headwind condition, but is desired to operate well at a 20% longer range of Washington, D. C. to San Francisco with mild headwinds.

We air-vibrate blades to get longer life in jet engines

You recall the old trick in which a singer shatters a glass by holding a high note at the critical vibration frequency of the glass.

Here at Allison we use a similar idea to determine the fatigue life of jet engine compressor and turbine blades. By electro-magnetic, air jet (as pictured) or siren excitation, we stress-cycle the blade at increasing vibration amplitudes until its endurance limit is reached. This enables us to predict "critical" engine speeds—and with this data we modify blade design for higher performance and longer service life.

Then we go a step further: The information obtained in these laboratory tests is checked by installing strain gages on blades in running engines. This stress-measuring equipment had to be specially designed by Allison engineers to meet the high temperatures, since gages of this type were not commercially available. Many Allison engine improvements have been based upon the results of these tests.

All of this is one example of the engineering thoroughness that goes into every Allison jet engine — a thoroughness that pays off in the greater dependability that has won the confidence of American jet pilots everywhere.

Allison

**DIVISION OF GENERAL MOTORS
INDIANAPOLIS, INDIANA**



World's most experienced designer and builder of aircraft turbine engines
—J35 and J71 Axial, J33 Centrifugal Turbo-Jet Engines, T38 and T40 Turbo-Prop Engines



Also consider that for the design temperature conditions in the best revenue season, take-off field length is critical.

Assuming that it is a four-engine aircraft and the weight of each engine is increased 500 pounds (2,000 pounds total), to maintain payload and field length, take-off weight will require an increase in the order of 10,000 pounds and an increase in take-off power of about 12%.

Of total turbine engine power plant drag, Steiner relates that it accounts for only 10-15% of total airplane drag at cruise, even for external engine pod installations. Engine inlet and outlet conditions are more important than minor drag items.

* The airline fuel technician can effect great savings for his company by evaluating and continually monitoring fuel specifications, avoiding restrictions which may not be needed and which are directly reflected in fuel costs, Pratt & Whitney's P. D. Doran warned.

In support of the need for such a technician, Doran told of the complexities of turbine fuels; of the lack of a reliable test of the filterability of present fuels whose hydrocarbons, in the form of waxes, solidify at low temperatures and cause serious clogging of filters; of the need for heating devices on tank trucks to prevent this solidification and means for its prevention in aircraft parked outdoors in low temperatures or in aircraft in flight where subjected to extremely low temperatures at high altitudes; and of the urgent need for a good turbine fuel identification system, something considerably better than we have now, to permit the intelligent ordering of fuels by the airlines. Suggested: a means of identifying a fuel's burning characteristics along the lines of the octane number system of aviation gasoline.

* The possible differences in civil and military aircraft gas turbine designs are a matter of assigning relative values of importance to the five fundamental characteristics of performance, output, reliability, cost, and durability.

With this basic rule, General Electric's R. T. Holland further defined the characteristics as:

Performance: Specific fuel consumption and fuel-plus-engine weight at altitude.

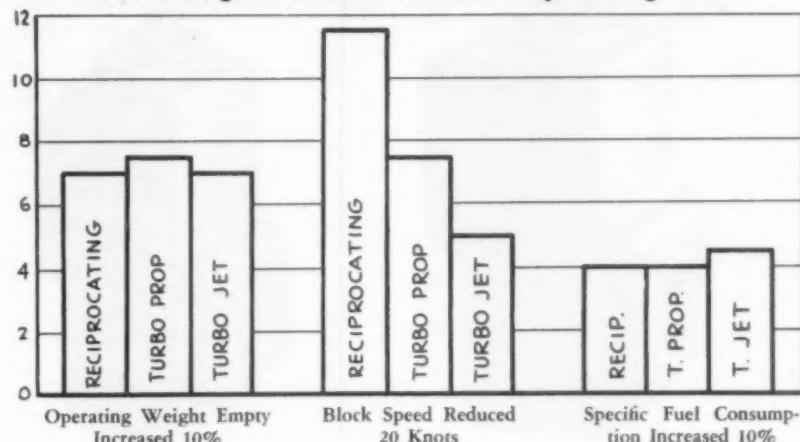
Output: thrust.

Reliability: freedom from sudden or unexpected malfunction and failure.

Durability: ability to resist wear and give long life.

Cost: operating costs.

Percentage Increases in Direct Operating Cost



Take-off performance assumed not critical. If critical, above percentages would greatly increase.

Assigning the proper relative importance to each of the design characteristics makes it evident that the greatest difference between combat military and civil aircraft lies in durability and cost, according to Holland, who found it difficult to support the belief that performance, output, and reliability characteristics should vary between the two.

To "optimize" a design for a typical military requirement of a non-combat nature, Holland offers these concepts toward increasing durability and reducing costs:

Desensitize the design to quality control by reducing the requirements for high quality control. Anti-friction bearings dictate a very high degree of quality control; an engine design with a minimum number of bearings offers a higher degree of reliability and durability, the probability of bearing trouble being lowered. Also reduce the number of parts requiring high quality control. Compressor blades require high quality control standards; use of a minimum number of individual blades will reduce exposure and statistical chances of failure.

Processes: Single operation forgings; avoid folds and defects of multiple forging operations;

Foreign object damage: Shrouded stator construction in axial flow compressor designs may be more capable of sustaining foreign objects without serious failure. Spacing between stators and rotors may have a direct bearing on the control of this type of damage, but a more effective screen than currently in use is needed if the damage is to be reduced.

* Minor repairs in line maintenance are the key to extended overhaul periods for jet

engines, with periods in excess of 1,000 hours reached as early as 1951 on both centrifugal and axial flow engines, Allison's Charles E. Dixon reported.

Tracing experience on the Allison J-33 centrifugal engine and the J-35 axial flow type over eight years and 2.5 million flying hours, Dixon provided these minor repair part replacements and man-hour estimates:

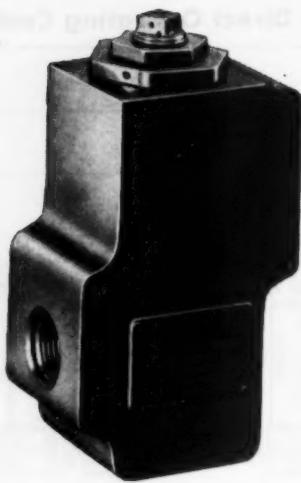
J-33 CENTRIFUGAL ENGINE

Part Name	Man-Hours
Combustion chamber assembly	3 hrs.
Igniter plugs	1/4 hr.
Fuel nozzles	2 hrs.
Air adapters	2 hrs.
Turbine bearing support assembly	26 hrs.
No. 3 and 4 bearings	18 hrs.
Turbine wheel	18 hrs.
Nozzle diaphragm	20 hrs.
Ring & tube assembly	20 hrs.
Turbine buckets (100% change)	5 hrs.
Exhaust cone	2 hrs.

J-35 AXIAL FLOW ENGINE

Part Name	Man-Hours
Turbine nozzle	10 hrs.
Turbine wheel	8 hrs.
Turbine nozzle & wheel	12 hrs.
Inner liner	2 hrs.
No. 3 and 4 bearings	24 hrs.
No. 3 bearing	20 hrs.
No. 4 bearing	6 hrs.
Turbine bucket	1/6 hr.
Exhaust cone	2 hrs.

Introduced in 1949 when the allowable overhaul period for both engine types was about 350 hours, the minor



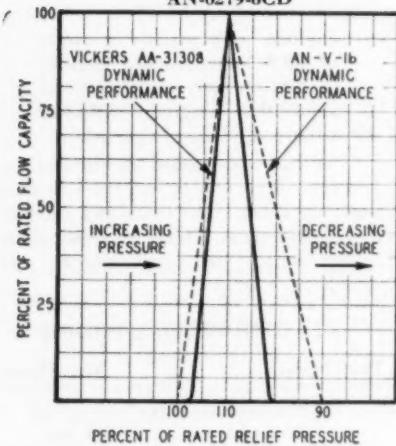
Vickers Model AA-31308-H
AN-6279-8CD



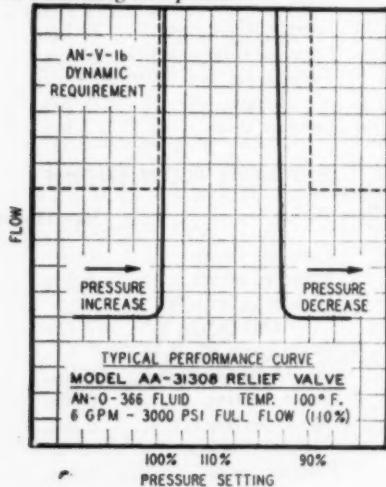
Vickers Model AA-31306-H
AN-6279-6CD



Vickers Model AA-31304-H
AN-6279-4CD



Pressure variation from cracking point to maximum rated capacity of Vickers Two-Port Balanced Piston Relief Valve is considerably less than permissible under Specification MIL-V-5523. Consequently less pressure differential is required between relief valve setting and unloading valve pressure.



Curve showing extremely low internal leakage of Vickers Two-Port Balanced Piston Relief Valve.

These **VICKERS**
RELIEF VALVES
TWO PORT • BALANCED PISTON
Conform to
Specification MIL-V-5523

The Vickers Two-Port Balanced Piston Relief Valves illustrated here conform to Specification MIL-V-5523. Their rated capacities (2, 5 and 9 gpm) are greater than required by this Specification (1.5, 3.5 and 6 gpm respectively).

The curves at the left illustrate two important characteristics of these valves: (1) very low pressure variation from cracking point to maximum rated capacity, and (2) extremely low internal leakage (less than required by Specification MIL-V-5523). Smoother operation and greater accuracy throughout a wide range of pressure adjustment are other significant advantages. Operating pressure range is adjustable from 500 to 4500 psi without parts change.

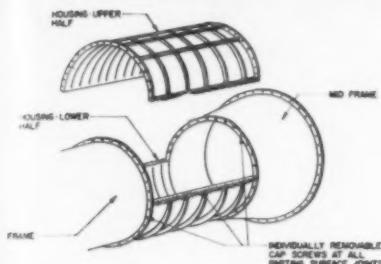
These valves are also available in four-port models and can be provided with a vent control for unloading the system pressure. For further information about the complete line of Vickers Balanced Piston Relief Valves write for new Bulletin A-5204.

VICKERS Incorporated
DIVISION OF THE SPERRY CORPORATION

1502 OAKMAN BLVD. • DETROIT 32, MICH.

46-2
ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

Compressor Design Housing



EASY REMOVAL of either half of stator housing aids rotor inspection, permits in-place blending of minor blade damage.

repair has raised the allowable period over the 1,000 hour mark, with the non-repair allowable period at 600 hours for the centrifugal engine today and 500 hours for the axial flow engine. Year by year the periods have been elevated according to this schedule:

THE J-33

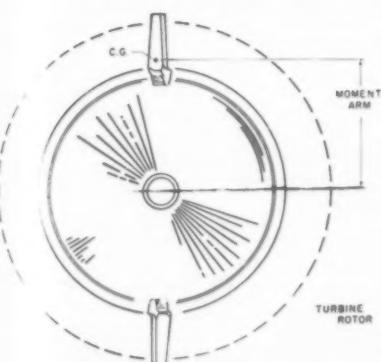
Year	Allowable TSO
1945	25-50 hrs.
1946	50-100 hrs.
1947	100-200 hrs.
1948	200-300 hrs.
1949	300-500 hrs.
1952	500-600 hrs.

THE J-35

Year	Allowable TSO
1947	50 hrs.
1948	50-100 hrs.
1949	100-300 hrs.
1950	300-400 hrs.
1951	400-500 hrs.

In this same period the thrust rating of the J-33 engine was improved from about 3,800 pounds for the Model 1 to about 5,400 for the Model 3. On the

Turbine Blade Replacement



FIELD REPLACEMENT of turbine blades is permitted if provided in pairs with closely matched moment weights.

J-35 the power rose from the same 3,800 pounds on the Model 1 to about 5,800 pounds on the Model 3.

Accumulated flight time of 200,000 engine hours on the J-33 at the end of 1948 grew rapidly to over 1 million hours in early 1952; for the J-35 some 50,000 flying hours in mid-1948 sharply rose to almost 800,000 hours by the start of 1952.

To Dixon, the minor repair approach has made the turbojet and the piston engine more comparable than ever before. When jet transports become a reality in airline service, routine line maintenance will permit extended time between overhauls, reduce maintenance and transportation costs, reduce the number of engines in the overhaul pipeline, reduce the number of engines needed for spares, and provide lower cost per ton-mile.

• Close coordination in design between the airframe and power plant manufacturers is required to insure maximum accessibility for maintenance, was Curtiss-Wright's Marshall W. Galliers' contribution, rounding out the session.

These basic maintenance design features must be recognized:

Easy access for routine inspections and servicing.

Rapid removal and installation provisions.

Assuring these ends are some specific design features:

Minimum connections between engine and aircraft.

Localized components where routine service is required. The axial flow engine lends itself to a wide choice of accessory groupings and locations.

Quick-acting drain and bleed valves for servicing and quick attach-detach provisions for replacement of fuel pumps, starters, generators, and hydraulic pumps.

Compressor housing design allowing for removal in sections to permit rotor inspection and blending of minor blade damage.

Rotor blade designs permitting field replacement without rebalancing.

The maintenance design considerations are many; those above are but a few. To Galliers, this must be a continuing effort, contributing in large measure to increased reliability and more economical operation of jet engines.

Jet transport aircraft operation is largely a matter of jet engine economics and the Society of Automotive Engineers has given the industry a good look at the economics of the engine, its basic design related to the aircraft, its maintenance design so vital to an airline, and the fuel that it will use, with its cost and its problems.

Convair Program Rotates Executives

Consolidated Vultee Aircraft Corp.'s San Diego division has begun a job rotation project to give its executives broad experience. N. W. Bouley has been designated acting chief engineer until March 9 because of the absence of F. W. Fink, now on business in the east. When Fink returns to San Diego he will become acting works manager of Plant 1, relieving A. W. Morgan, while Morgan takes a month-long course in materials and purchasing at UCLA. The UCLA course ends March 9 and the men will then resume their old jobs.

MILITARY BRIEFS

"We do not fully understand all of the problems of high-speed flight. Innovations in design should be supported by more adequate research." The speaker: Dr. Jerome C. Hunsaker, Chairman of the National Advisory Committee for Aeronautics. His request: "Further modernization of the NACA research laboratories and, above all, adequate operating funds." The Air Force recently showed its regard for research by awarding contracts to four research organizations for studies of combat techniques.

• •

Early this month the first Australian-built English Electric Canberra should be completed. Within the next few weeks the first Rolls-Royce Avon of the type needed by the Canberra is expected to be tested at the Commonwealth Aircraft Corp. plant in Sydney. Pre-production North American F-86 Sabre is due to fly some time afterwards.

• •

"High cost" drove United States Overseas Airlines out of the Korean-Pacific airlift last October, when the Air Forces Air Materiel Command ended Overseas' contract for the operation of four DC-4's. The carrier had been receiving \$1.85 per mile, some 33¢ above the average rate paid other operators.

• •

Convair's R3Y turboprop seaplane transport will probably turn out to be named the "Tradewind," the selection of a board of judges who chose from names submitted by some 10,000 Consolidated Vultee employees. Two other names, however, "Conquistador" and "Galleon," were also submitted to the Aircraft Naming Committee of the Munitions Board for consideration.



AMERICAN AVIATION

SALUTE TO A 15-YEAR VETERAN

... Still Making Aviation History!

THE MOST ADAPTABLE AIRPLANE EVER BUILT! That's the Chance Vought Corsair . . . the Navy's great war-horse that has been both land and carrier based—can hedge-hop or fly at high altitudes—has been an escort fighter, an interceptor, a fighter-bomber, a night fighter, and a photographic airplane.

In 1938, when near-sonic speeds were just a gleam in a designer's eye, the XF4U-1 was conceived. Designed around a 2,000 h.p. engine, it became the first fighter to reach 400 m.p.h.

Proved at Guadalcanal, it soon became the backbone of shore-based Marine and Naval air, supporting the relentless advance across the Pacific—Rabaul, Tarawa, Kwajalein, Eniwetok, Guam, Saipan and other history-making engagements.

At the close of 1944, the battle-proved Corsair was taken aboard aircraft carriers to meet the threat of improved Japanese aircraft. It went on to Okinawa and Iwo Jima and was on hand for the surrender in Tokyo Bay.

At the end of the war, the Corsair was the only piston-engine fighter whose performance for the Allies was advanced enough to warrant continued development on an uninterrupted post-war production schedule.

That's why it was ready for use by United Nations forces at the beginning of the Korean conflict in June 1950, and soon was accounting for 82% of all close air support sorties flown by Navy and Marine pilots against targets assigned by air support controllers in Korea.

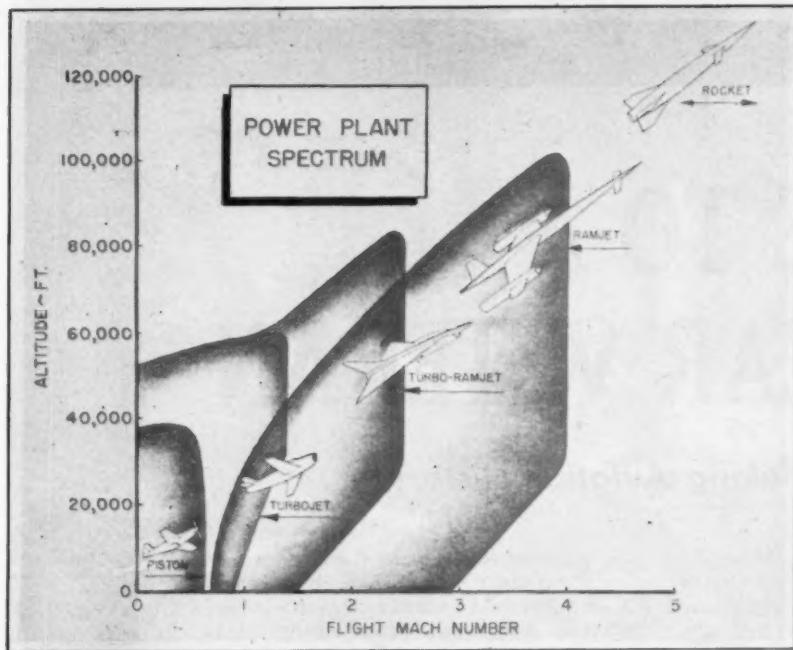
Since the Corsair was first wheeled from the production lines, more than 12,000 of the gull-winged craft have been built, including a large order for the French Navy just completed. During the years many engineering and production changes have been made—but it is still basically the same stout-hearted fighter it proved itself at Guadalcanal a decade ago.

The Corsair has been in continuous production longer than any other military airplane. And *still* this great veteran goes on making aviation history!

Chance Vought Aircraft • DALLAS, TEXAS

ONE OF THE FOUR DIVISIONS OF UNITED AIRCRAFT CORPORATION





Mach 2 - 4: Ramjet Stamping Ground

Marquardt's chief designer sees ramjet as power plant of missiles, bombers and even local service transports.

By WALTER A. KILRAIN

AFTER the turbojet, what? The ramjet, says Malcolm Harned, chief designer for Marquardt Aircraft Co., for in the speed range between Mach 2 and Mach 4 there's nothing like it:

- Its thrust per pound of weight is higher than anything except a rocket.
- Its net thrust specific fuel consumption is lower than that of both turboramjets and rockets.
- Its initial cost per pound, being no greater than that of other high-performance engines, makes the cost per horsepower notably less than that of other engines.
- Its simplicity (half a dozen moving parts) promises high reliability.

Within the next few years local service lines may find a convertiplane with ramjets on its rotor tips the answer to their equipment problems, supersonic interceptors will begin to use the engine as their primary power plant (with an assist from rockets), supersonic bombers will use it for the last minute sprint toward the target, and guided missiles will capitalize on its advantages most of all.

Facing this bright future is an engine that is not as simple as its

nickname, "the flying stovepipe," would suggest.

Actually, Harned points out, the engine puts air and fuel through the same paces that any other air-breathing engine must. The air is scooped in at the front as the engine moves along, compressed and mixed with fuel in the diffuser, heated when the fuel burns, and exits through the exhaust nozzle. In the turboramjet an air compressor in the form of a turbojet is added.

The main characteristic of the ramjet, as its name implies, is that air is "rammed" into the engine by its motion through the air. This eliminates a compressor and results in the "simplest possible basic engine configuration."

The faster the engine is flying, the more the air is compressed. Since thermal efficiency is directly related to the ratio of compression (or expansion), thermal efficiency increases with speed, and specific fuel consumption drops as a result.

At relatively low speeds, of course, this characteristic is a drawback for the ramjet; its thermal efficiency doesn't equal that of other engines until Mach 2. When the engine must be started from a standstill there is a real problem (with rockets as a convenient answer).

On the upper end of the speed scale the ramjet is limited by the rising tem-

perature of the free stream of air, which reaches 1,400° F. at about Mach 4. At this temperature the metal skin of the aircraft is about to become red hot, while inside the engine the burning of hydrocarbon fuels can do less and less to increase the temperature, since those fuels can produce temperatures of only about 3,500° F. at best. The amount the temperature can be increased is a factor in the power output, so this sets a speed limit for the ramjet. Designers need not regret this limitation too bitterly, however. As Harned observes, "2,700 miles per hour should be a satisfactory speed in the earth's atmosphere, since you could reach Los Angeles from New York in less than one hour."

The turboramjet, with its compressor, comes to the end of its rope long before this limit, at about 1,700 mph, at which point the total temperature of the inlet air approaches the limit that the turbine blades can stand.

The ramjet, aside from its high thrust and low fuel consumption in the Mach 2-4 range, has a strong argument in the simplicity of its construction. A supersonic 100,000-hp ramjet's half dozen moving parts give it a considerable advantage over the piston engine which contains over 250, and even over the gas turbine, which usually has over 40. Another point in the ramjet's favor is that none of its half dozen parts are in contact with hot gases.

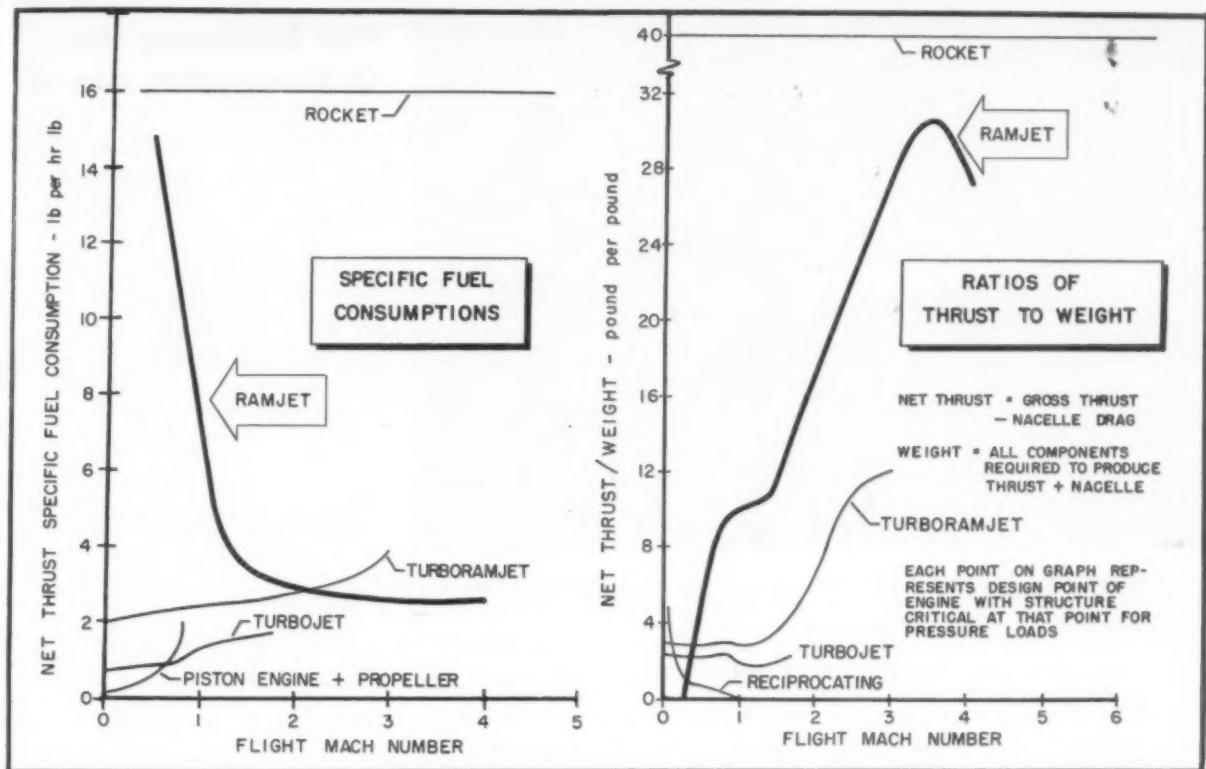
Harned makes the claim that "all types of high performance aircraft power plants cost approximately the same to manufacture in dollars per pound." The ramjet's high thrust per pound obviously gives it a high score on the horsepower-per-dollar scale as a result, and its low specific fuel consumption at high speeds reduces operating costs.

Ramjet Installation

Installing the ramjet is relatively easy if it is set in a nacelle. This arrangement permits the engine to be developed independently of the airframe, isolates the airframe from engine vibration, permits the engine to be changed without affecting the airframe, and makes access to both of them easy. The drawback here is some increase in drag that crops up in certain configurations.

Uses for the ramjet below the speed of sound are few and far between, since this is not its most efficient operating area. Target drones, helicopters with ramjets on the rotor tips, and convertiplanes are the most likely application in this range.

• **Convertiplanes** are Harned's idea of the prime example of a subsonic ramjet aircraft. "By using small, high speed rotors with tip ramjets for vertical ascent and propellers driven by rotary engines for forward motion, a high speed convertiplane with good range



could very simply be achieved . . . the ramjets are only used for a few minutes in takeoff or landing and therefore the fuel consumption is a negligible consideration."

Reducing the drag of the non-burning ramjet is one problem here. By the time an airframe is ready, however, Harned expects the problem to be solved by the development of a ramjet with a variable shape.

* **Helicopters** using the ramjet have already been developed by Hiller and McDonnell. The engine's high thrust-to-weight ratio argues in favor of it here, but its high fuel consumption at sub-sonic speeds inevitably limits its usefulness.

* **Target drones** make the most of the ramjet's low cost per horsepower. The Navy's KDM-1 drone uses the Marquardt XRJ 30-MA-8 engine at a cost of about 50¢ per horsepower. In contrast, reciprocating engine costs run at least \$5 per horsepower.

In the supersonic field, the transport has dim prospects, no matter what engine is used, because of the high operating costs involved. Even here the ramjet comes out ahead, with operating costs at Mach 2 ranging from 30¢ to 5¢ per ton-mile, as estimated by Hage and Fitzsimmons of Boeing. Comparable costs for a Mach 2 turbojet with afterburner would range from 40¢ to about 75¢.

In the military applications, ramjets would probably be reserved for use by bombers during the final approach to the target, with the more economical afterburning turbojet used for cruising and take-off.

Turbojet interceptors, Harned believes, will move toward the stage when they will use ramjets as their primary power source, with rockets setting the aircraft and engine into motion initially. In the meantime, the first move will be to convert the turbojets into turboramjets by adding afterburners and diffusers designed for ramjet compression.

Until Mach 2

This arrangement will work well enough until speeds of Mach 2 are reached. At this point ramjet efficiency will nose out that of the turboramjet. The turboramjet might get a new lease on life above Mach 2, however, by bypassing the air around the turbine, thereby converting itself into a ramjet, if the technical problems of ducting can be solved.

Most fertile field for the ramjet promises to be that of supersonic guided missiles. Here there are three obvious advantages:

* **Speed:** Such missiles will operate at speeds above Mach 2, the ramjet's favorite stamping ground.

* **Cost:** Since the missiles are expendable, the low cost of the ramjet will

be an important factor.

* **Fuel:** Negligible costs here too, since a pound of liquid fuel will cost less than 1/100 of a pound of the airframe.

Air-to-air missiles fired from supersonic aircraft would need no rocket boosters, since the air would already be ramming into the engine with sufficient speed at the instant of firing.

Pilotless bombers would be able to take advantage of the attractive propulsion range parameter of the ramjet: the speed divided by the net thrust specific fuel consumption. Range is directly proportional to this factor, and the ramjet comes out well ahead of all other power sources, including rockets.

In the field of pilotless interceptor aircraft all the factors point to the ramjet teamed with a rocket: maximum speed, range close to 500 miles, low cost, vertical launching to eliminate the need for runways (allowing interceptors to be spotted about the countryside almost anywhere), and high thrust-to-weight ratio in order to give a high rate of climb.

"The ramjet potentially will provide propulsion for aircraft," Harned concludes, "in a speed-altitude area much greater than that explored by man in the past fifty years of aircraft development. The boundaries of this area for ramjet propulsion will likely only be exceeded with rocket motors, probably utilizing nuclear energy."



Cessna's Model 310 "Businessliner," newest of the twin-engine commercial private planes, made its first flight on January 3. It is scheduled to go into line production beginning in 1954. Chief engineering test pilot "Hank" Waring flew the 310 during its initial 30-minute flight. Wing tip tanks, which permit reduction of three feet in overall wing span, are new to this class aircraft.

Model 310 Specifications

Length	27 feet 1 inch	Height	10 feet 2 inches
Span	36 feet 1 inch (including tip tanks)	Powerplants	Two 225-hp Continents

Other features include: Provision for four passengers plus pilot; engine exhausts of the jet augmenter type; and full feathering props.

**SCINFLEX ASSURES
YOU THE LOWEST VOLTAGE
DROP IN THE INDUSTRY!**

When operating conditions demand an electrical connector that will stand up under the most rugged requirements, always choose Bendix Scinflex Electrical Connectors. The insert material, an exclusive Bendix development, is one of our contributions to the electrical connector industry. The dielectric strength remains well above extreme requirements within the temperature range of -67°F to $+275^{\circ}\text{F}$. It makes possible a design increasing resistance to flashover and creepage. It withstands maximum conditions of current and voltage without breakdown. But that is only part of the story. It's also the reason why they are vibration-proof and moisture-proof. So, naturally, it pays to specify Bendix Scinflex Connectors and get this extra protection. Our sales department will be glad to furnish complete information on request.

- Moisture-Proof • Radio Quiet • Single Piece Inserts • Vibration-Proof • Light Weight • High Insulation Resistance • High Resistance to Fuels and Oils • Fungus Resistant • Easy Assembly and Disassembly • Fewer Parts than any other Connector • No additional solder required.

**Plan Emergency Use
Of Corporation Aircraft**

A comprehensive plan for emergency utilization of all corporation aircraft, including the more than 270 DC-3's in this classification, has been worked out by the Defense Air Transportation Administration and the Corporation Aircraft Owners Association. Final clearance is being sought before the plans are revealed.

This announcement was made by Jean DuBuque, executive director and secretary of the Corporation Aircraft Owners Association, following a statement by North American Aircoach Systems that its president, J. B. Lewin, had suggested a "mobilization plan designed to utilize the vast reservoir of DC-3 corporate executive aircraft in the event of a military, civil defense or other national emergency" in letters to incoming top-level government officials.

DuBuque commented that the Burbank non-scheduled carrier's announcement came as "somewhat of a surprise." DuBuque continued that he was puzzled as to the grounds on which Lewin, operator of a non-scheduled airline, presumed to speak for the corporation owners. He felt that the carrier was apparently unaware that a comprehensive plan is underway.



**BENDIX SCINFLEX
ELECTRICAL CONNECTORS**

Bendix

SCINTILLA MAGNETO DIVISION of
SIDNEY, NEW YORK



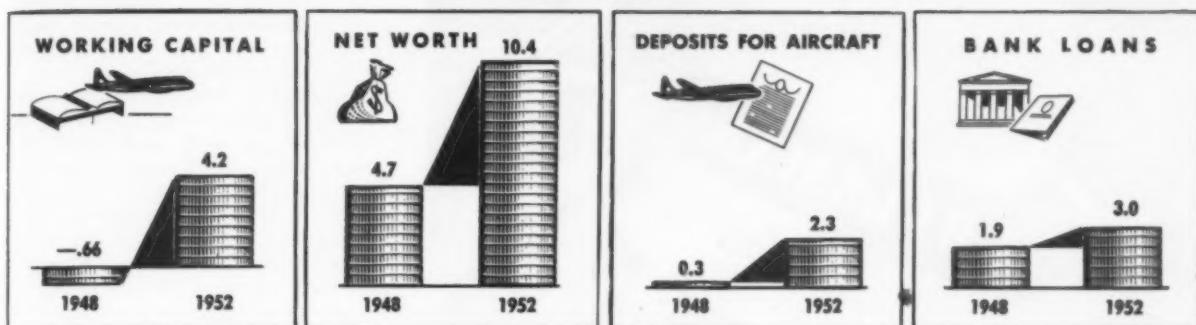
FACTORY BRANCH OFFICES: 118 E. Providencia Ave., Burbank, Calif. • Stephenson Bldg., 6360 Cass Ave., Detroit 2, Michigan • Brouwer Bldg., 176 W. Wisconsin Avenue, Milwaukee, Wisconsin • 582 Market Street, San Francisco 4, California

AMERICAN AVIATION

IMPROVEMENT OF FINANCIAL POSITION

FISCAL YEARS ENDING JUNE 30

Millions of Dollars



"Phenomenal" Growth Attributed to NAL

NAL's financial recovery in past four years cited as "most outstanding" achieved in industry.

By ERIC BRAMLEY

A"PHENOMENAL" 10-year growth and a financial recovery in the past four years that is one of the "most outstanding ever achieved in the airline industry" have contributed toward making National Airlines one of the most valuable air carriers in the intermediate group, according to a recently released analysis of the company.

The study was made by Selig Altschul, aviation advisor, who was retained by NAL to make an "objective and impartial" study.

From its 1939 position as the smallest and "least promising" domestic airline, NAL in 1951 ranked fifth in net income, with only the Big Four reporting larger earnings, the report said. Most of the other carriers occupied in 1939 much the same relative positions they enjoy today, it stated, adding that NAL is the "outstanding exception."

The company's demonstrated productive power has given it an entrenched position that assures it "of a prominent role in any realignment of routes that may take place in its general area," it continued. With the "continuation of recent trends . . . and in the absence of unknown contingencies, National is in a position to surpass its previous record level of earnings."

Ten years ago, NAL's total operating revenues of \$315,000 represented less than 6/10 of 1% of the industry's \$55 million total. In 1951, its \$26 million revenues were 3.9% of the \$665 million total. In the fiscal year ended June 30, 1952, less than 2.5% of revenue came from mail pay (the carrier is on a non-

subsidized mail rate) against 68% in 1939.

Contributing to NAL's growth have been "aggressive passenger revenue development," one of the most compact route patterns in the industry, long-haul business (647-mile average), a "small and closely-knit management group," an incentive system for officers and supervisors, and healthy labor relations, the report noted.

It added, however, that while the NAL route system possesses "strong characteristics incorporating productive long-haul traffic, its limited scope of operations does contain certain inherent weaknesses. The three main deficiencies in the route pattern are (a) an insufficient number of strong intermediate

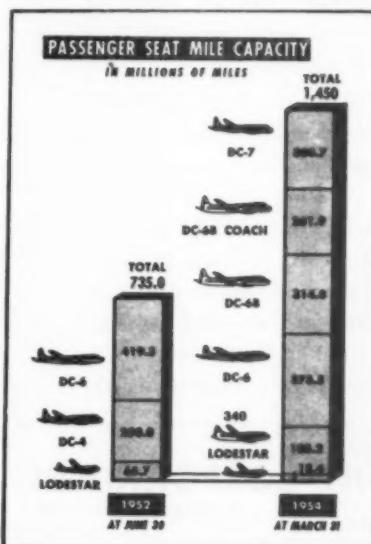
or feeder stops, (b) lack of flexibility through too great a reliance on one route, and (c) greater than average seasonal traffic variations."

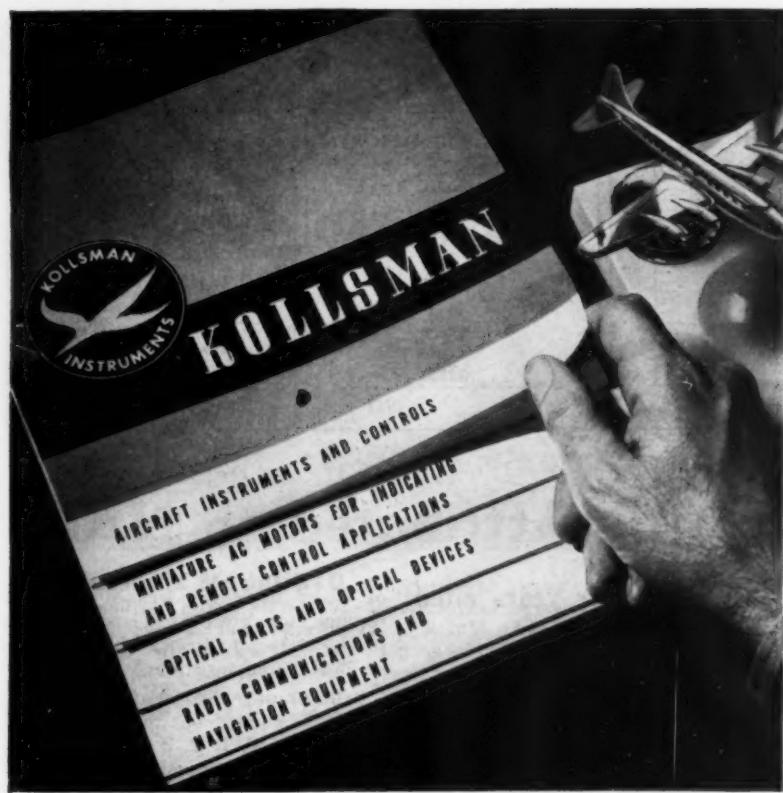
Illustrating the seasonal variation, the study pointed out that in the year ended June 30, 1952, if traffic had continued at the peak volume attained in the third quarter (January-March), the year's net operating profit would have been \$8,252,000 instead of \$3,384,000. This illustrates the "tremendous leverage" in airline operations—"once operating costs are covered, virtually all additional revenues received flow through to net."

Mergers

A merger of National and Colonial (a proposal which is now involved in a CAB proceeding, together with an Eastern-Colonial merger proposal) would modify seasonal fluctuations of both lines, but wouldn't correct NAL's basic problem, "as it would append another route at the northern terminal, leaving the north-south character of the system unchanged," the study said.

"The fundamental criterion remains that National would be justified in acquiring Colonial only at a price more in keeping with its value," it added. "For example, if National's earlier bid of 7/8 of a share for one share of Colonial had been successful, it would have necessitated the issuance of 451,150 shares of additional common stock in payment of the 515,600 shares of Colonial. This would have resulted in a 45.1% increase. This transaction would have diluted National's equity by substantial proportions in order to acquire the properties of a company which without regard to any reappraisal of assets





Which part interests YOU?..

Perhaps that's one question that rightfully belongs with your future planning.

For, like ourselves, your manufacturing divisions may be toiling night and day in the interests of America's safety.

But to research scientists—seeking the solution to some intricate problem of instrumentation and control—Kollsman offers an experienced hand. A reputation based on inventive ingenuity, precision craftsmanship and world-over acceptance of its products.

In manufacture or research, there is no finer name than Kollsman—designers, developers and makers of:

**Aircraft Instruments and Controls
Miniature AC Motors for Indicating and Remote Control Applications • Optical Parts and Optical Devices • Radio Communications and Navigation Equipment**



KOLLSMAN INSTRUMENT CORPORATION
ELMHURST, NEW YORK

SUBSIDIARY OF GLENDALE, CALIFORNIA

Standard COIL PRODUCTS CO. INC.

showed a net equity of \$2,081,731 at the 1951 year-end, or 21.9% of National's.

"For National to match the current Eastern offer for the Colonial property would involve an even greater outlay highly disproportionate to the value to be received in exchange."

Discussing NAL's management, the study said that "during its earlier development and until recent years, National's policies and sense of direction emanated almost entirely from Mr. Baker (G. T. Baker, president). While the president continues to exert strong leadership, the organization concept has come into greater prominence in the National management with responsibility and initiative having a broader base than at any time in the past . . .".

NAL has an incentive system under which a fund equal to 5% of earnings before taxes is contributed as a bonus to about 15 top officers and supervisors. Another 5.7% is made available to about 169 station managers, shop foremen, and other supervisors.

(CAB's 1951 records showed that Baker received \$30,000 salary and \$51,400 in bonus and indirect compensation. Walter Sternberg, vice president-sales, received \$20,000 and \$30,634.)

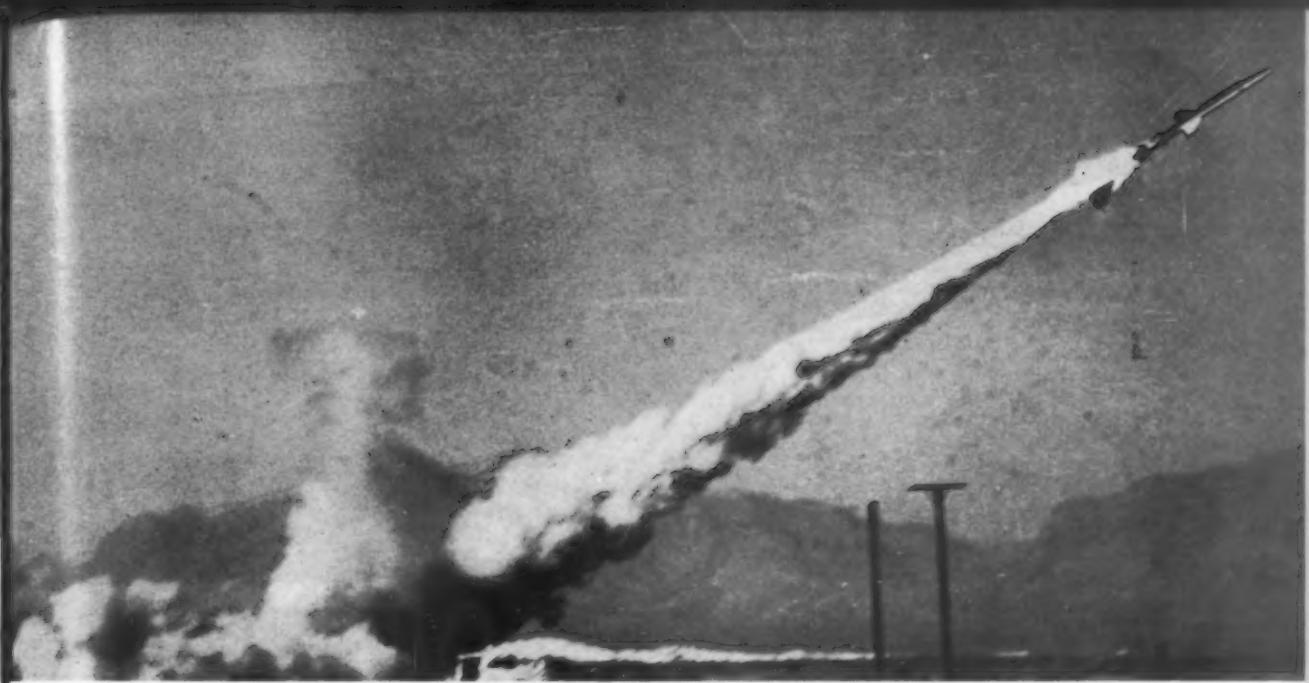
The study also revealed that management, which only five years ago was involved in a bitter dispute with its pilots, awarded these pilots a bonus of 5% before taxes for fiscal 1952 "as a gesture of good-will."

Commenting on NAL's credit position, the report pointed out that the company's present bank loan is unsecured and carries a 3% interest rate. NAL's new \$12,000,000 unsecured bank credit agreement is on terms that "compare very favorably with other airline loans granted this year."

Since 1948, when grounding of DC-6's and a series of strikes put NAL in a negative working capital position, the company has effected a net gain in its net worth position of \$5,685,860. "Particularly significant is the increase of more than \$4.8 million in the company's working capital account during this period."

NAL is following the sound financial policy of applying a pay-as-you-go approach in acquiring its new equipment, the study said.

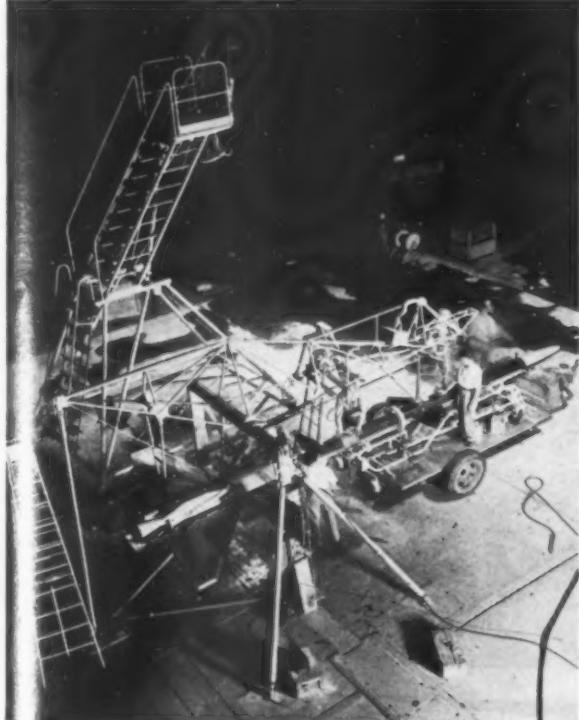
The company has on order eight DC-6B's, eight Convair 340's (with option for six more), and four DC-7's involving an outlay of \$20,434,654 (accompanying chart shows how seat-mile capacity will increase). To finance the program, NAL proposes to apply the \$12 million bank credit, proceeds from sale of assets no longer required, and normal earnings, together with cash from depreciation throw-offs and with current working capital funds.



"GAPA" MISSILE picks up speed after launching. Missiles ranged up to 16 feet in length.

Boeing Fires a Missile

More than 100 "GAPA" missiles were built and fired at supersonic speeds from 1945 to 1949 by the Boeing Airplane Company under contract to the USAF. Here are the first pictures of the project.



FIXED AND PORTABLE firing platforms were also designed by Boeing. Missiles reached speeds up to 1,500 mph.



MISSILE IS PREPARED for launching from fixed stand at Alamogordo, N. M. Program was used to gather data for later projects.

1934 ... Ford Tri-motor



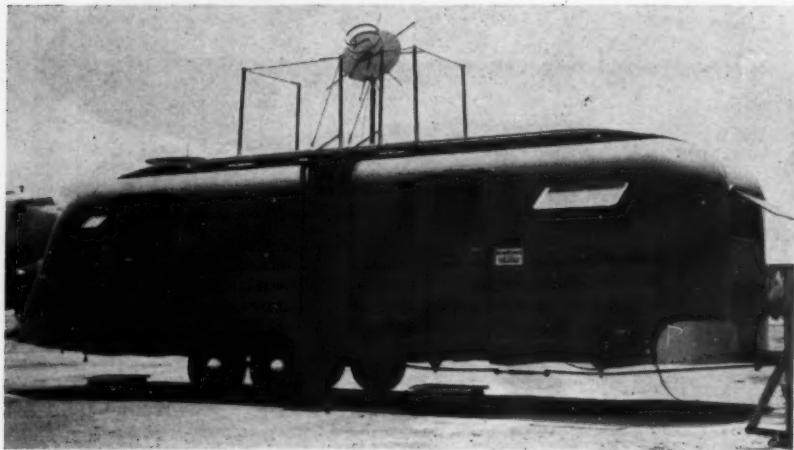
1953 ... American Airlines DC-6B Flagship



From 1934 to 1953,
American Airlines
has used SINCLAIR
AIRCRAFT OILS
Exclusively!

Sinclair Aircraft Oils can prove their quality in your operations. For full details phone or write Sinclair Refining Company, Aviation Sales, 600 Fifth Avenue, New York 20, N. Y.

FEBRUARY 2, 1953



Telemetering trailer is used by Douglas Aircraft Co. to check in-flight performance of latest model high speed airplanes. Helix antenna on roof is turned to track the airplane, picking up signals from instruments in aircraft via FM radio.

Douglas Tracks A Plane



Engineers in trailer monitor flight, receiving data from 176 instruments. On-the-spot analysis of data allows them to direct pilot to perform any desired maneuver, or warn him to avoid dangerous conditions. One flight may consequently equal months of testing as it was previously handled, involving use of motion picture camera carried in the plane.

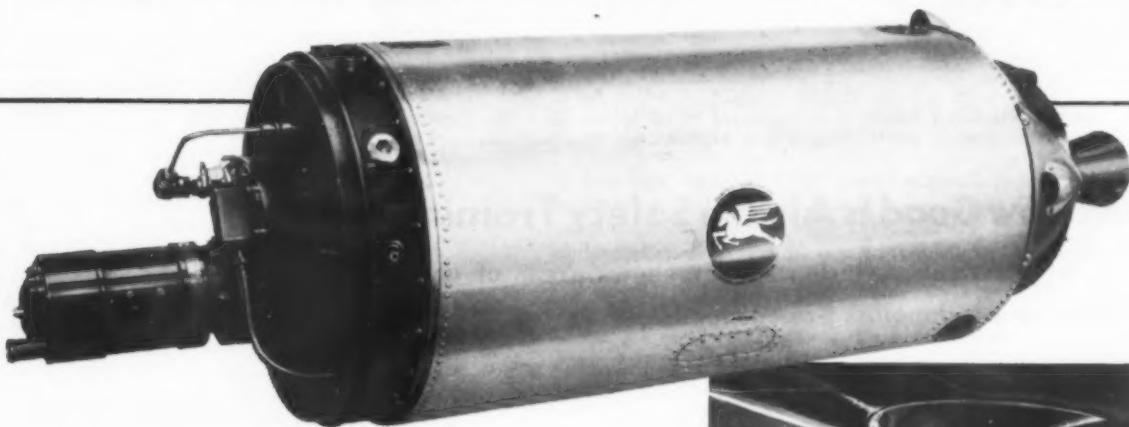
Equipment in trailer includes, at left, two 88-channel FM radio receiving racks with monitors; two magnetic tape recorders, in right foreground; and pole at left, by which antenna on roof is rotated.

by
ght
eed
ned
als
dio.

NEW HIGH IN SPECIALIZED

POWER

3 LBS. THRUST FROM 1 LB. WEIGHT



The J-44 Monocoque Turbo-Jet Engine...
Designed and Built by Fairchild

One of the most compact engines in its power class ever produced is the Fairchild J-44 Monocoque Turbo-Jet. Only 72 inches in length, 22 inches in diameter and weighing only 300 pounds, the J-44 delivers a thrust of 1000 pounds.

Another example of a Fairchild design which met difficult and exacting specifications, the J-44 typifies the creative engineering ability of the Fairchild Engine Division.

Right now, the Fairchild J-44 Monocoque Turbo-Jet is being produced exclusively for the Armed Services. When conditions permit, this mighty midget will become available to boost payloads and lower operating costs of airline transports and other aircraft.



ENGINE AND AIRPLANE CORPORATION
FAIRCHILD
Engine Division
FARMINGDALE, N.Y.

Aircraft Division
Hagerstown, Md.

Stratos Division
Bay Shore, L.I., N.Y.

Guided Missiles Division
Wyandanch, L.I., N.Y.

More and more POWER developments for America's Armed Forces





TRAINING AS A TEAM is demonstrated in this photo of Flying Tiger Line flight crew in wet ditching drill at Hansen Dam near Burbank, Calif.

Just How Good Is Airline Safety Training?

American Aviation survey shows areas of conflict in basic ideas, pinpoints present methods.

By JOSEPH S. MURPHY

HOW do the airlines go about impressing personnel with the importance of safety? Is crew training for emergency operations coordinated? Is the purchase of flight simulators being considered? Are line captains favored over "professional" instructors for crew training?

Asked these questions in a recent survey conducted by AMERICAN AVIATION in cooperation with the Flight Safety Foundation, some twenty-four airlines representing the large trunk carriers, the local service lines, the U.S. international carriers, and foreign airlines offered their comments, highlighting these specific subjects:

- **Safety instruction**—Statistics, Civil Aeronautics Board accident reports, and photos of actual accidents are the favored methods of impressing personnel with the importance of safety. Posters and bulletins are the means most commonly used to bring the information to personnel.
- **Training manpower**—Airlines in the majority oppose any percentage of over-hiring to allow for training, but recognize some figures as high as 12% in existence to satisfy its needs.
- **Emergency training**—Among airlines engaged in overseas operation, most pilot personnel and cabin attendants are trained as a crew unit. In domestic operation

such training is coordinated on an individual basis, but handled separately.

- **Flight simulators**—Two airlines have purchased them, others are considering them, but the consensus is that the price tag is too high. Feelings are mixed on their cooperative use.
- **Best teachers**—Strong opinions exist that line captains are the best instructors for crew training, but the margin is small over the number favoring professional instructors.

"We see no need to impress pilot personnel with the importance of safety inasmuch as the pilot is acutely aware of its significance at all times during flight operations," was one airline opinion received. But the other twenty-three airlines participating in the survey offered some eighteen various methods of accomplishing this end, with statistics, CAB accident reports, and photos of actual accidents used by most.

One airline distributes the daily CAA mechanical difficulty reports to each of its pilots. Flight Safety Foundation and National Safety Council literature, along with Aero Medical Association bulletins and Shell Oil Company posters, earned specific mention.

Asked for their views on a proposal that airlines over-hire to insure that 10% of all active crew members will always be in full-time training, more than half replied that the proposal was either unsound, uneconomic, or unrealistic.

"No good" was the opinion of Eastern Air Lines' F. A. Stone, director of flight operations, explaining that "the best training in the world is on-the-job training . . . this we do all the time through the use of captains for co-pilots, check captains over all." Another airline comments, ". . . both very expensive and unnecessary; due to the fact that crew members have sufficient time off between trips, the training can be accomplished at that time."

Is pilot and stewardess training for emergency operations coordinated? Airlines engaged in overseas operations are inclined to carry this training a step beyond mere coordination, eight operators reporting that crews are trained as a unit. Twelve of the twenty-three airlines represented report that cabin attendants actually open emergency exits during training and ten require that these personnel operate a life vest. Among the domestic airlines, with few exceptions, crew training as a unit is not practiced, although the majority provide for coordination between the training divisions for flight and cabin personnel.

Flight simulators? Only Pan American and United Air Lines reported their actual purchase, nine others have considered them. The type of training they offer is favored unanimously but their high initial cost continues to be the major obstacle to widespread adoption. Another is the necessity of having a different cockpit configuration for each type of aircraft.

Five-Year Study

Reporting on a five-year study, one major airline concluded that economic justification of simulators for refresher training is at this date very difficult, if not impossible, for the domestic air carrier, but the economy of new aircraft training through simulators appears much more interesting. The operator hopes "that as military defense demands for simulators decrease and the field becomes more competitive," the situation may change sufficiently to permit their economic justification.

The suggested cooperative use of simulators to offset this high initial cost has many supporters, particularly among the local service airlines, but feeling is that such a program could not be practical without standardization of cockpits. A major trunk carrier, opposed to the idea, "may have to reconsider" because of the expense involved in sole ownership.

Does a "line captain" make the best airline pilot training instructor? Or is the professional instructor superior? A recap of airline practices, according to the survey, reveals a marked difference of opinion:

East
er
the
-job
ime
lots,
line
and
rew
be-
om-

for
Air-
are
step
era-
l as
air-
at-
exits
that
west.
few
it is
urity
the
cabin

ner-
er-
rted
ave
ing
but
be
lop-
ng
ach

one
mic
ther-
, if
car-
raft
ears
ator
ands
ield
tua-
mit

of
cost
ong
is
re-
ck-
l to
er,"
sole

ost
is
A
to
nce

ON

HERE'S GOOD NEWS!

NEW TVOR



AT LESS THAN

one fourth the cost of VOR!



TVOR single unit installation needs only an inexpensive shelter on the field.



TVOR changes fair-weather to all weather airline service.



TVOR guides corporation aircraft to their home fields, in spite of low ceilings.



TVOR works with standard instrumentation. Private planes "home" on their own airfield.



TVOR commercial transmitters are the same as those designed and built for the CAA.

MARYLAND ELECTRONIC MANUFACTURING CORPORATION
COLLEGE PARK 16, MARYLAND

Trunk airlines—line captains (3), professional instructors (2), supervisory pilots (1).

Feeder lines—line captains (3), professional instructors (3), company designated CAA check pilots (1).

U.S. international & foreign airlines—line captains (2), professional instructors (3), supervisory pilots (3).

Unclassified carriers—line captains (2), professional instructors (0), check pilots (1).

TOTALS—line captains (10), professional instructors (8), supervisors (4) and check pilots (2).

"Line captains, by all means" was the report of Eastern's Stone. "Professional instructors do not have the required operational judgment. Crews taking instruction respect experience." Also supporting the use of line pilots, Capital's J. B. Franklin, vice president-operations, adds "We are very successful in using line pilots . . . being familiar with routine operation they are better able to recognize and correct any undesirable tendencies."

Favoring the professional instructor, one airline merely states, "We have tried line captains." Of similar feeling, Chicago & Southern's W. T. Arthur, vice president of operations, explains, "Because of the size of our airline, chief pilots do instruction as an additional duty. If the size of the training operation permits, professional instructors are the ideal."

Almost unanimous was the airline support of motion pictures as a medium for safety training, with 21 operators subscribing to their use and two others planning their adoption.

Experimenting with the use of slide films in conjunction with a lecture recorded on a wire recorder, one airline sees this method as more effective and more easily kept up to date. Five reported favorable use of films made available through CAA lending libraries, and a foreign airline offered the recommendation that International Air Transport Association members work out an exchange of films on safety training.

Used by Northwest Airlines are films entitled "Ditch and Live," "Land and Live," "Land and Live in the Arctic," and "Making Sea Water Drinkable." Favorably viewed by others are American Airlines' "This Way Out" and United's "One Chance in a Million."

Safety organizations? Of two reported in existence, United Air Lines' reports to an executive vice-president, with a director of safety heading up a three-divisional organization: flight safety, safety education, and ground

Over-Hiring for Safety

Although generally opposed to over-hiring a percentage of flight crews for training alone, airlines estimated the percentages shown. Variations in airline approach to recurring crew training are also shown:

Trunk Airlines	Pct. of flight crews required for training	Refresher training (percentages & methods)
United Air Lines	5%—increase to 10% in 1953	N. A.
Eastern Air Lines	N.A.	90% actual performance 5% paper work
Chicago & Southern	2%	30% visual aids, 30% examination 40% actual performance
Air Lines		10% visual aids 10% paperwork 5-10% in aircraft 70-75% lectures, exams, wet drills
Northwest Airlines	5%	
Capital Airlines	7%	N.A.
Feeder Lines		
Southern Airways	N.A.	50% visual aids/classroom 50% actual performance
North Central	2%	10% visual aids 20% paperwork 70% in aircraft
Airlines		10% visual aids 20% paperwork 70% airplane
Lake Central	None	

N.A.—Not Available.

safety. Although the direct responsibility for safety of an operation rests with the supervisor of the operation, the UAL Safety Department establishes programs to interest supervision and employees in safety, surveys and analyzes operations to aid administrative departments in prevention of unsafe practices, acts, conditions, etc., and provides a flow of safety education.

American Airlines' manager of safety administration reports to the operations manager, but works with all departments of the company on safety matters.

Without a specific safety organization, other airlines report this approach to the interests of safety:

- **Air Line Pilots Association Air Safety Committee**, chief ground instructor, and department heads of maintenance, stations, communications, and flying all hold monthly safety meetings; Allegheny Airlines.
- **Now forming safety committee** composed of one member from flight, maintenance, engineering and stations departments: Piedmont Airlines.
- **All department heads, foremen, and supervisors** attend safety meeting every two weeks: Southwest Airways.

The president of the company pre-

sides over a safety board reports one foreign operator; board includes the vice president-technical, vice president-operations, director of medical service, the flight division head, and will include in the future a safety officer.

More important than any single training procedure is the airline training philosophy, which these views of industry leaders reflect:

- Basic information given personnel in training programs has a direct bearing on the employee's decisions and adherence to company procedures and policies when performing his day-to-day duties: D. R. Petty, United Air Lines.
- You must sell training if it is to be accepted. You can't sell it by professional instructors; this type instructor is more interested in his own job and department: F. A. Stone, Eastern Air Lines.
- Training should be considered a never-ending process. Constant vigilance, line checking, examinations, paper reviews, in addition to required checks, are all essential . . . should never be considered a one-time proposition ending at that point: W. T. Arthur, Chicago & Southern Airlines.

- The training staff should be made up of instructors who are experts in the particular subjects in which they are teaching, such expertness coming from practical job experience. The operating group for whom the training is being done must man and plan its organizations and workload to allow time for organized accomplishment of the training: Frank C. Judd, Northwest Airlines.
- The art of training has become increasingly complex with each succeeding aircraft. At the conclusion of ground instruction, flight instructors of matchless skill and intelligence continue the process. By graduation the student has received the finest training money, time, and effort can provide. Training costs now make up for a large share of the money spent in operating costs. We will maintain our high standards of safety regardless of the cost. We rate safety through training first, passenger comfort second, and economy of operation third: J. B. Franklin, Capital Airlines.
- The limits to which any air carrier may develop the safety of its operation are directly due to the extent and completeness of its training program: Byron Moe, All American Airways.
- Training is useless unless the personnel involved realize the importance of the procedures. Training for training's sake will not do the job. It must be sold also: R. W. Clifford, Lake Central Airlines.
- Selection of the right individual is the most important step in the making of an airline pilot. Give him standard operating procedures that make sense, see that he knows and understands them (training) and see that he follows them (supervision): Anon.
- Training from the word "go" is the most important single item contributing to the safe and efficient operation of any organization. This is particularly so in the complex operation of an airline. There appears to be no substitute for outright familiarity: Anon.
- Actual experience is the best teacher. We try to simulate actuality to the extent permitted by safety and economics. Repetition is necessary to form proper habits and refresh memory and muscle: Anon.

Meet Your Editors



Saunders

MEET Keith Saunders, formerly legislative editor and now AMERICAN AVIATION's news analyst. This title means simply that, in Keith's capacity as managing editor of the *American Aviation Daily*, he receives all the raw material which comes into the office daily in the form of news releases, newspaper clippings, wire reports, and government agency reports. His judgment of news values is often reflected in the magazine through the close relationship of the two publications.

Keith's background of more than 20 years of newspaper and magazine writing and editing, including eight years of aviation writing, makes him unusually well qualified for his present post.

Educated at Elizabeth City (N.C.) High School and at the University of North Carolina, he went to work on his father's newspaper, *The Independent*, in 1930, and subsequently worked for the *Raleigh Times* as Capitol Hill reporter, the *Oxford (N.C.) Public Ledger* as editor, and the *Norfolk Virginian-Pilot* as general assignments reporter. He realized his initial goal of working on a metropolitan daily when he joined the staff of the *Baltimore Evening Sun* in January, 1945.

Assigned to cover industry and transportation, Keith soon became a frequent visitor at the Glenn L. Martin and Bendix Radio Division plants, and the wartime Baltimore base of British Overseas Airways Corporation. Before long, he was writing aviation news almost exclusively, covering aviation events around the U.S.A.

When Editor and Publisher Wayne W. Parrish offered him a job in December, 1946, Keith accepted immediately. He explained his decision later as follows: "American Aviation Publications then seemed to me to be the top outfit in aviation publishing. I figured that aviation was slated to grow into big business and that this company would grow with the industry."

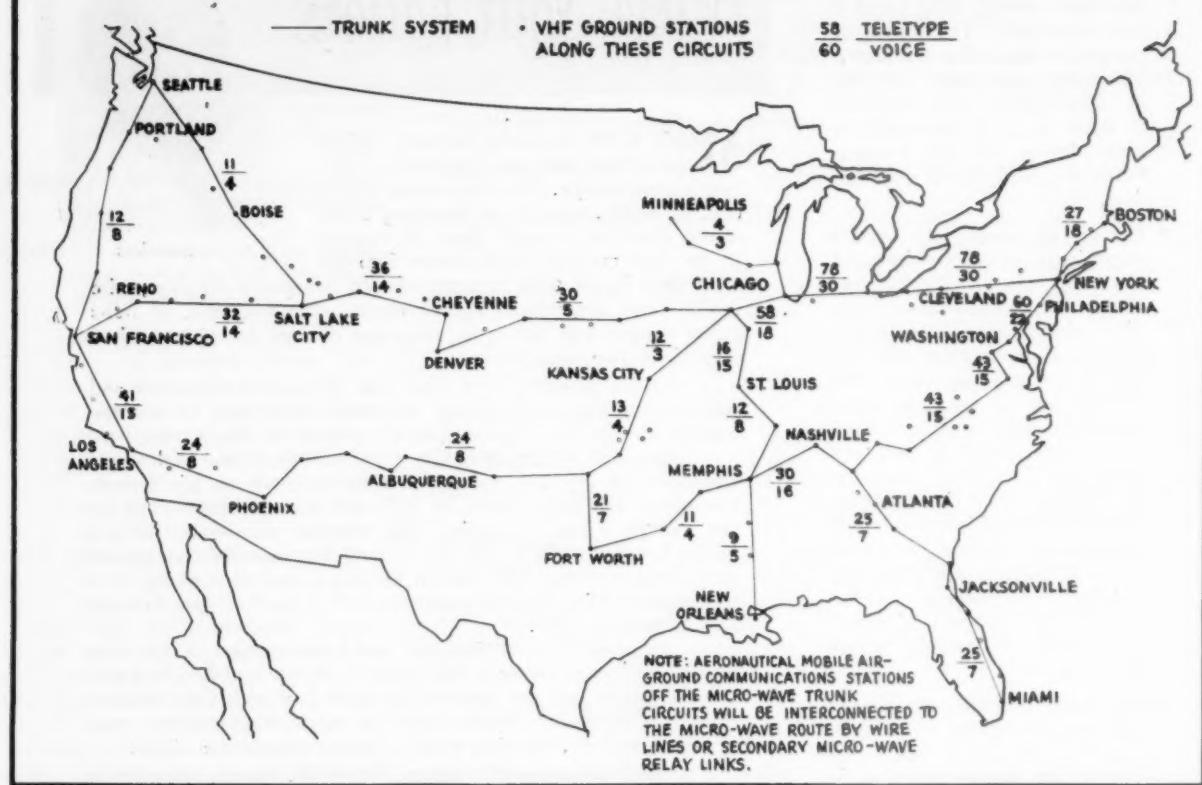
Keith has acquired a well-rounded knowledge of aviation in the more than six years he's been with us, having served as assistant managing editor of the magazine, airports editor, and legislative editor before becoming managing editor of the *Daily*.

Though his entry into aviation writing dates back only to 1945, Saunders had an interest in the industry long before that. His father interviewed Orville Wright for *Collier's* magazine in 1926, and in 1927 the elder Saunders became the founder and first president of the Kill Devil Hills Memorial Association, dedicated to honoring the Wright Brothers and furthering aviation. Kitty Hawk was in the same Congressional district as Elizabeth City, and Keith's father enlisted the support of the Congressional Representative from the district in persuading the government to build a fitting memorial to the Wrights atop Kill Devil Hills.

Keith is a good friend today of three men actively associated with the Wrights' 1903 flight: Alpheus Drinkwater, Coast Guard telegrapher who sent the message of the first flight to the outside world; Harry Moore, *Virginian-Pilot* reporter whose story about the flight was believed by few readers at the time; and Capt. Bill Tate, in whose home the Wrights boarded during their experiments at Kitty Hawk.

A member of the Aviation Writers Association and the National Press Club, Keith serves as editor of *National Aeronautics*, monthly publication of the National Aeronautic Association. He won the J. A. Pfeiffer Memorial Trophy of the Baltimore Chapter of NAA in 1946 for his "outstanding contribution to private flying in the Baltimore area," and won the trophy for the best sales and promotion story in the technical class of TWA's Annual Aviation Writing Competition in 1951.

PROPOSED AERONAUTICAL FIXED MICROWAVE RELAY AND INTEGRATED AERONAUTICAL MOBILE RADIO SYSTEM



Arinc Airs Views in FCC Microwave Hearing

Microwave communications equipment could open new possibilities for many everyday operational needs.

THE STARTING signal in a long range program to use microwave communications equipment for most of civil aviation's point-to-point and air-ground communications was sounded late last month by Aeronautical Radio, Inc. It is a program which may take 20 years but it is expected to bring with it air-ground telephone service for the passengers and better, cheaper, and more versatile service for all aviation needs.

Microwave equipment operates in the super high frequencies where the wave lengths are short. This means the signals do not follow the earth's curvature and consequently the range of a single station is short, about 30 miles. But the microwave transmissions are unusually free from general interference, and by placing repeater stations at 30-mile intervals broadcasts can be made over any distance.

Setting up a microwave system to replace the leased teletype and telephone

lines now used by the 190 groups using the services of Aeronautical Radio, Inc., would not be cheap. Data on microwave installations of this scope are rare but estimates indicate the cost might be on the order of \$500 per system-mile. It is estimated that the airlines now spend \$15 million per year leasing teletype and telephone lines from American Telephone and Telegraph and Western Union.

This is just a start. In a summary of testimony scheduled for presentation at the Federal Communications Commission's hearing into theater television radio frequency requirements, Arinc president J. S. Anderson notes that the aviation industry's requirements will grow 100% to 200% in the next five to 10 years, even assuming that existing services continue to be used. If an improved system comes along, many additional uses would swell the volume even further.

The airlines are not ready for micro-

wave equipment yet. Some airlines have not even started to consider the problem. Nor are the necessary airborne elements of such a microwave system ready. But Arinc has been put in the position of having to protect the airlines' stake in the microwave communications field or stand the chance of losing the necessary frequency allocations for all time.

Today Arinc, as the non-profit licensee for virtually all civil aviation needs, is using microwave equipment at eight points in California, Washington, and Virginia for remote control of transmitters. This is in accordance with a very general FCC order of February, 1948, under the category of fixed circuits for groups other than common carriers. But all phases of the communications field interested in microwave frequencies are wary that the present FCC hearing into the theater television industry's claim on certain of these frequencies in the 1,850-13,200 megacycle band may bring about specific allocations for specific groups.

To protect the industry's stake in this hearing, Aeronautical Radio has pre-

Will YOUR Company Be In Aviation Next Year?

Here are forty-four of the companies who form the backbone of aviation, in war or peace. Their names and the products they make, the services they offer, are part of the vocabulary of aviation.

Among hundreds of other companies, these have advertised, without exception, consistently and continuously in the past five or more consecutive issues of aviation's only all-inclusive directory.

The basic minimum for every sound aviation advertising program is AMERICAN AVIATION WORLD-WIDE DIRECTORY.

Spring-Summer
1953
issue
Closing Date
February 15
Plates: March 1



- 26 *Consecutive Issues*
Sperry Gyroscope Co.
- 22 *Consecutive Issues*
McDonnell Aircraft Corp.
- 21 *Consecutive Issues*
Flame Parachute Co.
- 20 *Consecutive Issues*
Turbolid Engine & Airplane Corp.
General Electric Co.
- 18 *Consecutive Issues*
W. Harris Thurston Division
- 17 *Consecutive Issues*
Flightex Fabrics, Inc.
Parker & Co.
Sinclair Refining Co.
- 14 *Consecutive Issues*
Goodyear Tire & Rubber Co.
- 13 *Consecutive Issues*
The Babb Co., Inc.
Elastic Step Nut Corp.
- 12 *Consecutive Issues*
Michigan Seamless Tube Co.
- 11 *Consecutive Issues*
Eclipse-Pionier Division
Paper Manufacturers Co.
- 10 *Consecutive Issues*
Aeroquip Corp.
Instrument Associates
Jack & Helms, Inc.
Levalla Aircraft Corp.
- 8 *Consecutive Issues*
The EG Corporation
Great Hydraulics
- 8 *Consecutive Issues*
Aero-Coupling Corp.
Electrical Engineering & Mfg. Corp.
The Hormel Co.
Perry Products Division
Pittsburgh Plate Glass Co.
- 7 *Consecutive Issues*
Aero-Products, Incorporated
Allison Engine & Farm Corp.
Bendix International Division
Buchen Aircraft Service, Inc.
Lear, Inc.
Lake Aircraft Corp.
Trotter, Inc.
- 6 *Consecutive Issues*
Air Associates, Inc.
Air Carrier Engine Services, Inc.
Bendix Products Division
Doleman Engineering Co.
Farr Electric Corp.
Trotter, Inc.
- 5 *Consecutive Issues*
Aerotac Corp.
Aerosphere Corp.
Breeze Corporation, Inc.
Consolidated Vulcan Aircraft Corp.
Simmonds Aerocessories, Inc.

Here's Why

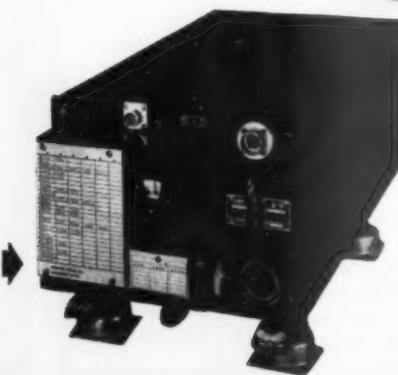
Leading



Transmitter Model AT-144. Manufactured according to ARINC characteristic No. 522. Frequency ranges 1.6-1.75 and 2.0-22.0 mcs. covering 144 independent crystal controlled frequencies. 10 tubes. Operates on 28-volt DC. Carrier power output 100 watts A1-A3. Without removing transmitter from rack, frequency plan can be altered by changing the crystals only. Weight 44 lbs.



Receiver Model AR-144. Frequency range 2.1-18.5 mcs. covering 144 crystal-controlled frequencies in 24 bands. 7 tubes. Weight 33.2 lbs.



International Air Carriers Specify **AEROCOM**

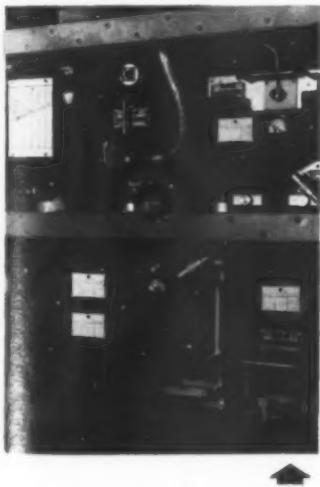
144 Frequency H. F. Communications Equipment

Flexibility, dependability, and power are important reasons why Aerocom's AT-144 and AR-144 are selected by the world's foremost international air carriers.

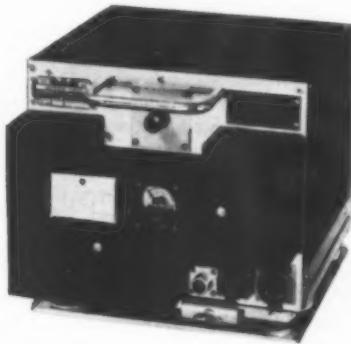
Flexibility—with separate transmitter and receiver, cross band operation is possible. Reception is possible without placing transmitter in operation thus avoiding radiation on unauthorized frequencies such as channels for weather broadcasts and time signals.

Dependability—the major component parts of this equipment have been proven in years of actual service. Simplicity of design has minimized the number of tubes required, all of which are operated conservatively.

Power—here is a new 100-watt high frequency airborne transmitter with unusually high average modulation level (by employing an adjustable peak clipper-filter). This transmitter with related power supply and



Automatic Antenna Tuner Model AAT.
Follows ARINC characteristic No. 525.
Designed to give minimum tuning time and maximum efficiency with grounded-type antenna employed on 4-engine aircraft. Frequency ranges 1.6-1.75 and 2.0-22.0 mcs. 8 tubes. Operates on 28-volt DC. Weight 19 lbs.



Power Unit Model D.P.U. Manufactured according to ARINC characteristic No. 523. Uses a well-proven, commonly-used dynamotor type. Operates on 28-volt DC. Weight 33 lbs.

These Aerocom engineering models were flown under service conditions during May and June, 1952, in a Pan American Trans-Atlantic Strato-Clipper.



RONAUTICAL COMMUNICATIONS EQUIPMENT, INC.

3090 Douglas Road, Miami 33, Florida

sented the broad outline of its needs to FCC. Arinc had previously attempted to stake its claim for radio frequencies in the HF/VHF bands for public air-ground telephone service and had been directed to study the use of the super high frequencies and related microwave equipment.

The system now proposed to FCC by Arinc would require about 160 megacycles band width in about the 6,000 megacycle range. This is a future requirement and one which depends on technological developments. If introduced today such a system would require 280-300 megacycles to provide 24 voice channels with 10-megacycle channel widths. Any one of these voice channels could be converted to 18 teletype channels.

As now visualized by Arinc this future fixed microwave relay and integrated aeronautical mobile radio system would start out using dual microwave installations at 30-mile intervals. These would be individual units for transmission and reception. Each microwave station would have 24 voice channels available. In congested areas, such as Washington-New York and New York-Chicago, duplicate installations would be required even in the initial system to handle current loads.

While such microwave installations are not just around the corner, the potential of such a system is great and the many new possibilities in aviation communications opened by equipment in this frequency band are attracting the forward thinkers.

The radio equipment manufacturers, who are already making such equipment for many ground services, are now attempting to indoctrinate aviation users. Collins Radio Company of Cedar Rapids, Iowa, for instance, has published a simple brochure on the general subject of aviation uses for microwave equipment.

In the early postwar years single teletype-phone circuits served most of the airlines' needs. Today the Chicago-Cleveland area is served by 43 individual teletype circuits, and 15 telephone circuits; Washington-New York is served by 34 teletype lines and 12 telephone lines, etc. The enthusiasts say these continually expanding needs assure microwave equipment a place in tomorrow's aviation picture.

Aeroquip Licensee

Aeroquip Corporation has reached a license agreement with Super Oil Seals & Gaskets, Birmingham, England, for manufacture and sale of its hose, fittings, and flexible hose assemblies in Great Britain, Australia, New Zealand, and South Africa.



PILOTING TRAINING AID for instruction on operation of omnirange instruments, used by Braniff Airways, is shown with inventor Ray Bruland, supervisor of communications engineering.

Omnirange Trainer a Hit at Braniff

A Braniff Airways radio engineer has found a means of training pilots on the operation of omnirange instruments. His answer is a device that cuts down training time, increases pilot interest, and presents a much clearer picture of what happens in these instruments than the "blackboard sessions" previously used.

The "Omni-magamus," as inventor Ray Bruland, BNF supervisor of communications engineering, has labeled the training aid, gives the pilot a pictorial presentation of what the instruments do when he selects his VOR course. The upper portion of the device displays a section of an aeronautical chart with a miniature plane that rotates on its own center by dial operation; another knob sets the desired course. The lower portion is instrumented with reproductions of a radio magnetic indicator, a Bendix Omnimag, and a gyro compass.

How it Works

In operation (and its operation is completely automatic) the pilot sets his simulated aircraft position, aircraft heading, and selected omnirange course. With this information, the device begins to operate. The result is an exact presentation on the instruments of what would occur in the aircraft instrumentation under similar flight conditions, and a literal picture of the relation of the airplane in flight to the radio facility or station.

The machine has no vacuum tubes and no electrical connections. A 100% mechanical operation, it contains some

47 gears, 10 sprockets, nine feet of chain, and countless small parts—cams, linkages and reciprocating arms, all supplied by Braniff when Bruland presented his plans.

Cost of the first model was about \$1,200 in labor and materials, with materials accounting for about \$100. The inventor estimates that some 1,500 spare-time man-hours were spent in drawing up the blueprints and translating them into the first unit. Later models would be expected to cost considerably less.

Improvements

The inventor has some ideas for its improvement. Provision for interchangeable aeronautical charts will permit duplication of any VOR station in the country. Substitution of different types of instruments of any standard omnirange instrumentation will adapt the device to all types of aircraft installations.

Braniff's pilots have taken a liking to the Omni-magamus, according to Captain Claude Seaton, head of link training. He estimates that, aside from its use in training sessions, the trainer gets from three to five hours a day of additional exercise by pilots who "drop in" to the link room to work out specific navigational problems.

To Bruland, the "magamus" is his third success at invention. Before coming to Braniff his ideas for improving control mechanisms were patented in his name and assigned to his former employer, Lear, Inc., Learcal Division.

What's New at AiResearch



New Cabin Pressure Regulator simplifies maintenance...lowers costs

Since AiResearch built the *first* Cabin Pressure Regulator for the Boeing B-29, this company has energetically pursued a research and development program to improve and simplify this vital Cabin Pressure Control.

The latest development, now proven by 1600 hours of actual airline operation, is a new, completely pneumatic, self powered regulator.

Half the weight of former units, it is far easier to service and needs no external power source. It combines the whole system into one unit on the pilot's control panel and requires only an outflow valve.

What is more, this new control is low in cost and adaptable to any outflow valve. The self contained rate of change for cabin pressure is always under control.

This most compact, easier to operate cabin pressure regulator reflects the constant effort of AiResearch engineers to design and produce superior equipment for high-altitude, high-speed flight.

•
Would you like to work with us?
Qualified engineers, scientists and skilled craftsmen are needed here.

AiResearch Manufacturing Company A DIVISION OF THE GARRETT CORPORATION

LOS ANGELES 45, CALIFORNIA • PHOENIX, ARIZONA

DESIGNER AND MANUFACTURER OF AIRCRAFT EQUIPMENT IN THESE MAJOR CATEGORIES



Air Turbine Refrigeration

Heat Transfer Equipment

Electric Actuators

Gas Turbines

Cabin Superchargers

Pneumatic Power Units

Electronic Controls

Cabin Pressure Controls

Temperature Controls

FEBRUARY 2, 1953

as new as jet airliners!

THE H-6B GYRO-HORIZON DESIGNED FOR HIGH-SPEED AIRCRAFT

The new Sperry H-6B Gyro-Horizon provides *accurate indications—up to the speed of sound*. This significant advance has been achieved through the development of special temperature compensated parts, stainless steel gimbals, and stepped up gyro efficiency.

In keeping with the new speeds in jet transportation, the H-6B Gyro-Horizon also features improved quick-erection mechanisms. These incorporate a new, manual instantaneous starting-setting.

Again Sperry's advanced research and engineering is meeting the demands of increased speed . . . *with speed*. Our Aeronautical Department will be glad to supply complete information upon request.



FEATURES OF THE H-6B

Improved bezel presentation...with maximum reduction of parallax to eliminate angular distortion, improved reference airplane and adjustment, increasing cone of visibility, and elimination of working parts affecting visibility.
Three phase circuit protection indicator
Minimum of turning error • Non-Tumbling
Freedom of roll through 360 degrees



SPERRY GYROSCOPE COMPANY
DIVISION OF THE SPERRY CORPORATION

GREAT NECK, NEW YORK • LOS ANGELES • SAN FRANCISCO • SEATTLE • CLEVELAND • NEW ORLEANS • BROOKLYN
IN CANADA • SPERRY GYROSCOPE COMPANY OF CANADA, LIMITED, MONTREAL, QUEBEC

AMERICAN AVIATION

Aircraft Stocks 'Highly Speculative': S & P

Companies planning to develop commercial jet transports are not the best stock issues for speculation purposes, it was concluded by Standard & Poor's Industry Surveys in the latest analysis of the market potential of the aircraft industry. The survey voiced a warning on stocks of Boeing Airplane Co., Douglas Aircraft Co. and Lockheed Aircraft Corp., although conceding that all three rank among the better aircraft issues.

Despite the fact that a higher level of operations is expected in the aircraft industry for the next year or more, aircraft stocks are still "highly speculative." Speculative possibilities of individual issues are affected importantly by shifts of procurement policies of the armed services, and the industry's reliance on military orders makes aircraft shares "volatile market performers," Standard & Poor's said.

The current survey also struck a warning note with respect to shares of companies developing or planning to develop a commercial jet transport. The following are extracts from Standard & Poor's comments on individual companies:

Beech Aircraft Corp.: "The shares are a worth-while speculative holding."

Bell Aircraft Corp.: "The stock can be held as a speculation."

Boeing Airplane Co.: "Barring unusually large expenses in connection with development of a commercial jet transport . . . continued large profits are expected for some time. Although speculative, the shares are considered to be one of the better-situated aircraft issues."

Consolidated Vultee Aircraft Corp.: "As near-term profits may level off, the shares appear to have ordinary speculative prospects at this time."

Curtiss-Wright Corp.: "The common stock is regarded as a mediocre speculation, because the dividend policy may be more conservative than in the past. The yield on the highly speculative Class A is satisfactory."

Douglas Aircraft Co.: "The capitalization is simple, and the stock is one of the better-quality aircraft issues. Probable development of a commercial jet transport nevertheless tends to dim some of its medium-term speculative luster, although such a move could be constructive from a trade standpoint."

Fairchild Engine & Airplane Corp.: "The large stock capitalization limits price swings and the stock is considered to be an average type of speculation."

Garrett Corp.: "With the earnings

and dividend record good, the stock merits retention."

Grumman Aircraft Engineering Corp.: "Bonuses provided under target-type Navy contracts, Grumman's record as the lowest-cost operator, and the present substantial backlog point to favorable medium-term profits. On that basis, the speculative issue can be held."

Lockheed Aircraft Corp.: "While the earnings potential will be lessened if Lockheed enters the commercial jet transport field, the speculative stock currently merits retention."

The Glenn L. Martin Co.: "Although the stock is obviously unsuited for the average account, it can be held

for speculation by those in a position to assume the many risks involved."

North American Aviation: "Continued growth in volume is indicated for some time, and the shares merit speculative retention."

Northrop Aircraft: "While concentration on one basic type of plane represents a risk factor, the stock is a fair speculation at present prices."

Republic Aviation Corp.: "While high earnings are indicated over the next few years, the company's production is centered around one basic type of plane. This is a factor of weakness in respect to the longer-term outlook . . . too speculative for the average account."

Facts and Figures!

FIGURE:

The moral to this has something to do with "Winterization"—what pilots bring their planes to SAC to get, and what blonde

Ann Allen hasn't got in her training as an SMU

co-ed deep in the heart of sunny Texas. She can't skate, but her trim, 19-year-old, 5'6½", 118 lb. figure is mighty nice on ice.

FACT:

Few services performed in this winged world of ours can compare with Southwest Airmotive engine overhauls in the complete faith and confidence accorded them by pilots.

If you haven't flown behind a SAC-overhauled engine, you have missed one of flying's most trouble-free experiences. Our 200-man engine shop is an authorized service station for

both Pratt & Whitney Aircraft and Wright Aeronautical.





All business is specialized

... and nothing specializes on your business like your business paper

This smart business man spends his time where every sitzmark parks a prospect at his feet. He *specializes*. Your business is specialized, too... and so is your business paper. It's concentrated on *your business*. Both editorial and ad pages report what's new that's good... suggest new methods... gather in one place a raft of ideas on where-to-buy-what.

That's help you can't find concentrated into such quick reading time anywhere else! It's simple sense to read every page... every issue.

This business paper in your hand has a plus for you, because it's a member of the Associated Business Publications. It's a *paid circulation* paper that must *earn* its readership by its quality... And it's one of a leadership group of business papers that work together to add new values, new usefulness, new ways to make the time you give to your business paper still more profitable time.

NEXT ISSUE you'll be reading about...

- Interview with W. A. Patterson
- 12 Accident-Free Months
- New Fields for Hamilton Standard
- New Device Tests Approach Lights

American Aviation

1025 Vermont N.W., Washington, D.C.

One of a series of ads prepared by
THE ASSOCIATED BUSINESS PUBLICATIONS



Extra Section

By William D. Perreault



THREE ITEMS in the lighter vein showed up here in recent weeks. Couldn't resist passing them on.

Aer Lingus's Capt. J. C. Kelly-Rogers announced the appointment of Trans-Canada Air Lines' Jack Dyment to head up a sub-committee to study fuels for jet- and turboprop-powered aircraft in this manner:

"There is quite a tough problem with fuel
In conditions hot, humid or cool;
It imposes a strain on the chap at Bahrein
And the poor lonely hermits at Thule.
When it's light it increases the drag;
When it's heavy the line flow will lag;
But the task's on the back of Canadian Jack
And the answer is now in the bag."

In the "C A News," published by the Civil Aeronautics Club, appears this gem attributed to George S. Stathers, Airman Specialist in CAA's General Operations Division:

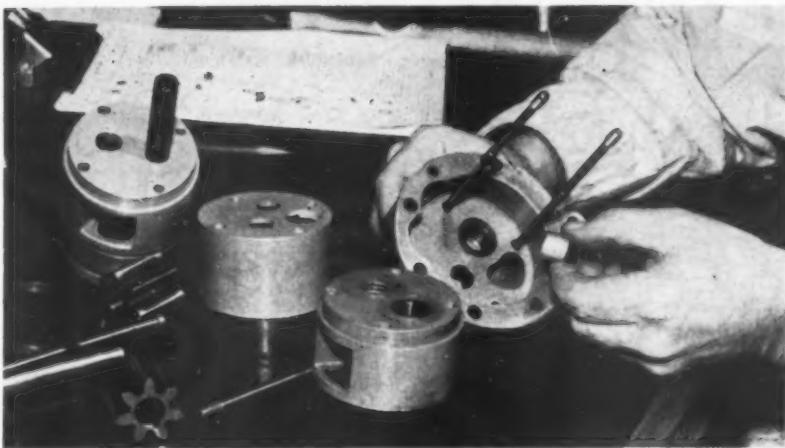
"Fourscore and seven years ago our forefathers brought forth a project for the rewrite of Part 20 based on the proposition that all regulations should make sense. We are now engaged in a great series of conferences testing whether this project, or any project, so conceived and so dedicated can get to first base. We are now met on a great conference site of those discussions. We have come to dedicate a portion of our time to the memory of those poor men who have struggled and died that this battered draft should not fade and perish from the earth. It is not in our power to approve this here document; those men who herein gave their last full measure of devotion have dedicated it far beyond our poor power to add or detract. The Board will little note nor long remember what we say here, but cannot forget what we are trying to do here. It is for us, the surviving to dedicate ourselves to the great portion of the task remaining before us that this draft shall have a new burst of activity, and that regulations of the people, by the people, and for the people shall not vanish from the Federal Register."

An editor's note: "It really hasn't been four score and seven years; it just seems that long."

The mail also brought a letter from Rogers Humphreys in St. Thomas, Virgin Islands. Humphreys is worried about the International Date Line and the pilot pay problems surrounding flights across the Date Line. This is the problem which he feels may bring about double pilot pay:

"Monday begins the instant after midnight, Sunday, at the International Date Line—the 180° meridian. An hour later Monday will replace Sunday at the meridian 15° west of the I.D.L. Two hours later Monday will start at 30° west of the I.D.L., and twelve hours later at Greenwich, on the prime or 0° meridian. When Monday begins at Greenwich, it will be twelve hours later or Monday noon at the I.D.L. Six hours later, when it is 6 p.m. at 180°, Monday is beginning at 90° west, three-quarters of the way around the earth. Five hours later still, Monday starts in mid-Pacific at the 165° meridian—only 15° or one hour east of the 180° meridian, where it is now 11 p.m. and Monday is 23 hours old. So, observe that the new day to begin one hour later on the 180° meridian will be Tuesday, while one hour east, Monday still has 25 hours to live. As Tuesday starts just west of the Date Line, Monday starts just east of it. The day has taken 24 hours to reach western Alaska, and has 24 hours to exist after starting there, making its duration on the earth 48 hours—believe it or not. See, why the double pay?"

Maintenance Bulletin Board



Bushings Prolong NWA Pump Life

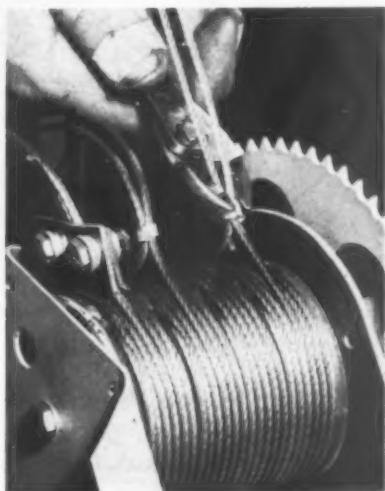
Northwest Airlines is now using the oil pumps on its Douglas DC-4 Pratt & Whitney R-2000 engines indefinitely, thanks to a suggestion which brought its originator, Leslie Zimmerman, engine parts inspector, a \$250 award.

Past practice at NWA has been to retire the pumps, which cost about \$240 each, after 3,000 hours of service because of normal wear. The Zimmerman suggestion calls for installation of four inexpensive bushings, three bronze and one steel, for the idler shaft holes in

each pump. The steel bushing is placed in the cover plate hole and the bronze bushings in the three holes next to the steel gears in center of pump.

With the new bushings installed, Northwest expects that their replacement will be required approximately each 6,000 hours of use and that the pump life, under normal circumstances, will be endless. The modified pumps have been in service since the beginning of 1952 with "very favorable" results—and an estimated saving of \$4,000.

made with a pair of pliers which have been drilled from the nose along the intersection of the jaws with a $\frac{1}{4}$ " drill, the clamps being squeezed around each pair of cables to be retained. A pair of diagonals provide an easy means of removal.



Before the Rodgers idea, TEMCO used the phenolic strip and bolt method of cable retention, with two strips bolted together at each end required to secure each pair of cables.



Polaroid Camera Used

Lockheed Aircraft Service International is using a Land Camera manufactured by the Polaroid Corp. of Cambridge, Massachusetts, to speed up maintenance schedules at its Idlewild

Airport (N. Y.) base. According to Robert A. Lamouree, LAS foreman shown using the camera, it has become a permanent tool in the day-to-day maintenance program at Lockheed. Work gets done quickly because skilled mechanics work better from pictures that show the problems plainly.

Scrap Tubing Secures Cable Assemblies

Scrap aluminum tubing is replacing the phenolic strips and bolts used to prevent aircraft control cable drum assemblies from becoming unwound during shipment or while in the stock bins at TEMCO Aircraft Corporation.

A development of TEMCO employee O. J. Rodgers, the new inexpensive clamps are fabricated from $\frac{1}{4}$ " tubing cut into short lengths, then cut through one side of the ring. Installation is

Daily Utilization

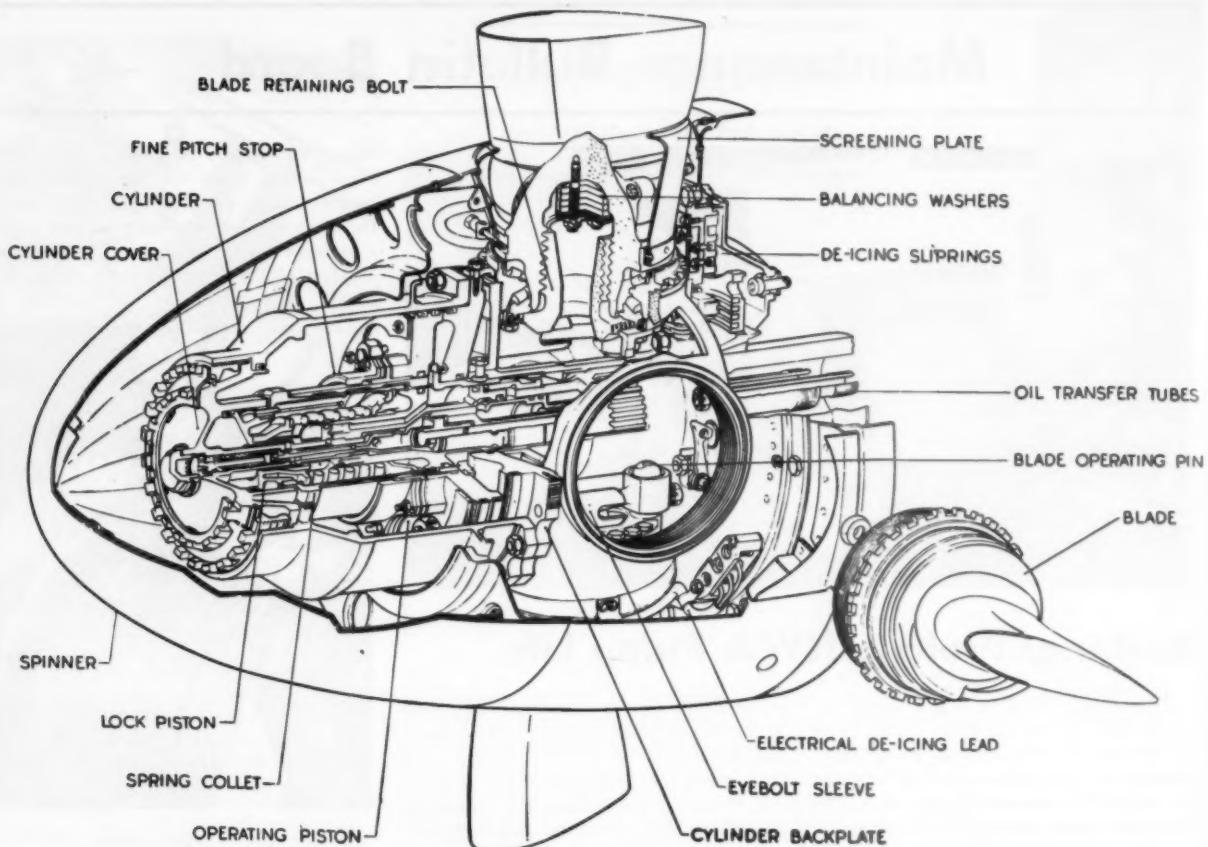
DOMESTIC CARRIERS

Average Revenue Hours of Use per Day per Aircraft for All Types of Service

	Sept.	Oct.
American	7:39	7:43
Braniff	7:10	6:21*
Capital	7:35	7:26
Caribair	4:00	4:00
C & S	9:20	9:23
Colonial	7:50	7:05
Continental	6:52	6:39
Delta	8:21	8:28
Eastern	8:07	7:54
Hawaiian	5:27	5:24
National	8:26	8:18
Northeast	7:17	6:34
Northwest	8:59	8:47
Trans Pacific	7:08	6:35
TWA	5:23	5:23
United	7:39	7:22
Western	7:57	7:57

* Figure represents use in scheduled services only. Figure combining scheduled and non-scheduled services was not reported.

NOTE: Above figures include utilization of aircraft in both scheduled and non-scheduled services.



PROPELLER AND SPINNER. This sectioned view clearly indicates the pitch-changing and lock mechanisms. Also shown are the slip rings by which the electrical de-icing current is transferred from the engine to the heater elements.

Props for Britain's Turboprops: Rotol

Design attention to maintenance problems produces prop for Britannia and Viscount capable of 20-minute change.

By ANTHONY VANDYK

PRODUCTION of the propellers, engine synchronizers, and auxiliary gearboxes for the world's first turboprop passenger transport—the Vickers Viscount—is being handled by Rotol Ltd., a company whose name does not, at first glance, indicate that it is controlled by two of the most famous members of the British aircraft industry: Rolls-Royce and Bristol. Rotol builds aircraft and marine propellers, plus a range of accessory drive equipment for over 150 different plane models, including all of Britain's super-priority aircraft.

During the design of the equipment for the Viscount's Rolls-Royce Dart engines, Rotol gave as much consideration to the problems of inspection and maintenance as to those of construction and performance. The end result has been the reduction of maintenance time and cost to "an almost negligible minimum."

All units are easily accessible and,

wherever possible, quick-release assemblies have been used. For example, the propeller can be mounted on or removed from the engine shaft without disturbing the main operating piston and link mechanism, while the ingenious lock mechanism may be handled as a unit. This enables a complete propeller change to be accomplished within twenty minutes.

The propeller mechanism is hydraulically operated and has four electrically heated blades for thermal de-icing. The pitch range is $80^{\circ} 50'$, which is greater than that normally associated with constant-pitch propellers in order to meet the starting characteristics of direct-connected turbine engines.

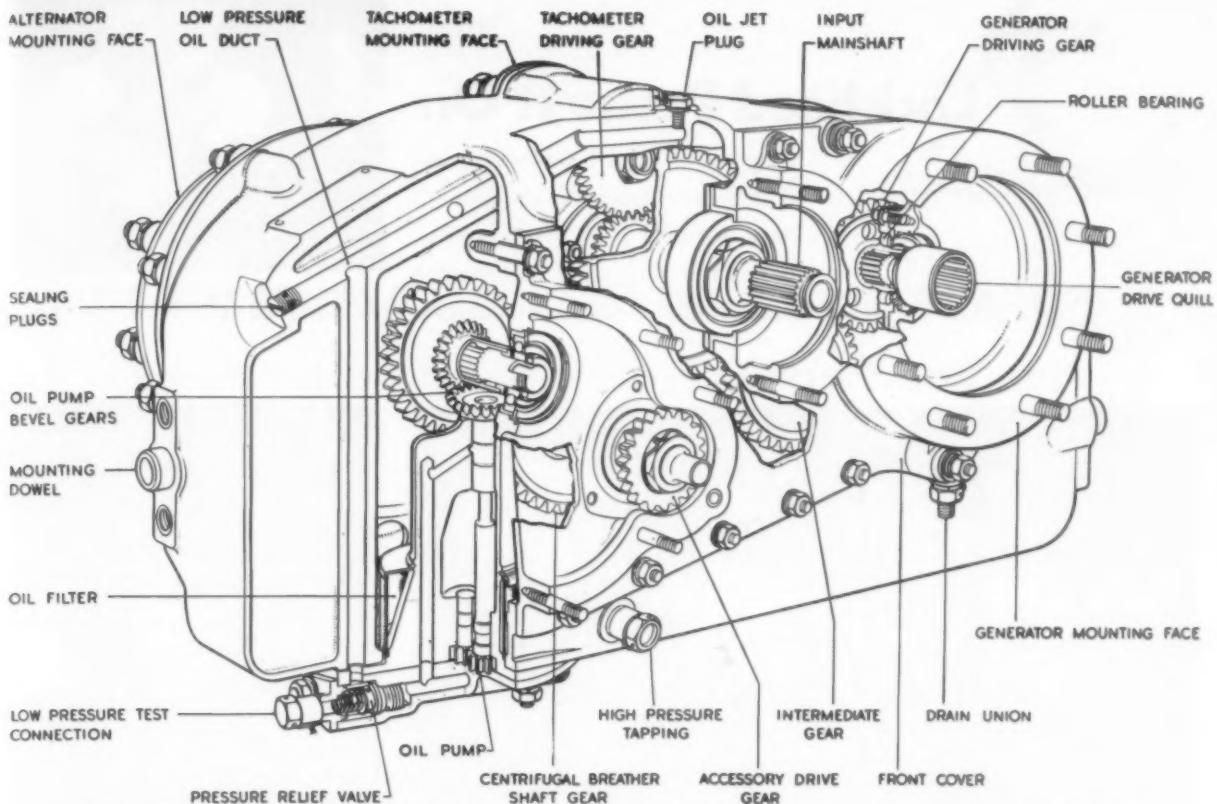
In the case of the Viscount propellers the normal fine-pitch angle is 21° and the starting pitch is 2° ; feathering angle is $85^{\circ} 50'$. The propeller accessory units provide for normal constant-speed operations, automatic control

of feathering, and a flight safety lock at the fine-pitch angle.

Heating of the propellers is performed by electrical elements accommodated in 0.085" deep and 30% chord width rebates in the inner two-thirds length of the leading edge of each blade. The boot cemented around the rebate is designed to fair in with the rest of the duralumin blade to maintain its aerodynamic efficiency.

Each boot consists of resistance wires and fiberglass heater pads imbedded in neoprene-type rubber by a special vulcanizing process. The three-phase, 208-volt current is supplied by an alternator mounted on the engine-driven Rotol auxiliary gearbox. This current is directed alternately by an automatic time-switch first to the propeller elements (blades and spinner shell) and then to the engine air-intake elements.

Such timing ensures that super-cooled water droplets, present in icing conditions, do not come into contact with continuously heated leading edges where they would not freeze but flow backwards to freeze at the trailing edges.



AUXILIARY GEARBOX. This is the basic gearbox on which the various accessories are mounted. It has its own lubrication system with a filter pump and pressure relief valve. Quill is shown within generator mounting face.

With cycling of the current, rapid heating and cooling take place. A thin layer of ice is allowed to form on the leading edges of the propeller blades and the front of the spinner shell. This ice layer acts as an insulator so that, when the current is switched on, heat rises more rapidly than on an unprotected surface. The inner section of ice, holding the rest of the layer to the surface, is then easily melted.

Once the ice is loosened, centrifugal force is sufficient to dislodge the remainder of the unmelted layer. The uncovered surface now cools rapidly, as the current has been transferred to the engine intake, and another thin layer of ice can commence to form.

The electro-hydraulic controller unit supplying motive power for operating the variable-pitch and lock mechanisms of the propeller is mounted on and driven by the engine. It primarily consists of a gear-type oil pump that boosts engine oil in pressure and delivers it to the propeller via a governing mechanism.

The governing assembly comprises a piston valve under the influence of spring-loaded centrifugal weights. Solenoid-operated valves for turboprop requirements are also incorporated. The feathering unit that supplies the extra high-pressure oil necessary for propeller feathering and un-feathering consists of

an electric motor driving an oil pump.

There are four different types of Rotol synchronizing units used with the Dart/Viscount installation—a synchronizer alternator, a corrector motor, a control panel, and a power-factor correction unit. Each engine is fitted with an alternator and three of the four engines have corrector motors, all operated from the control panel. The synchronizer alternator, which has an output of about 30 volts, produces the three-phase current required for operating the corrector motors.

The pilot's control panel carries a small three-position switch for a choice of master engines. When the pilot wishes to synchronize his engines, for example, at cruising rpm after take-off and climb, he has to adjust the engine throttles to the desired settings and then switch on the synchronizing equipment.

Any engine running faster or slower than the master will automatically be brought into line provided that the discrepancy is small. If one engine is running well below the speed of the other, the equipment will not make up the difference; the range is purposely limited to cover speed differences due to normal errors in throttle adjustments or slight changes in engine speeds.

The accessory drive equipment comprises four auxiliary gearboxes each with

its drive shaft. The principle of grouping accessories (such as cabin blowers, electrical generators, and hydraulic pumps) on an auxiliary gearbox attached to the airframe but driven by the engine offers considerable advantages over the old arrangement, where the accessories were fitted directly onto the engine.

The chief advantages are:

- Simplification of engine maintenance due to the absence of aircraft service accessories;

- Speeding up of power plant changes, as it is not necessary to disconnect the services;

- Meeting operator's requirements for different accessories without having to modify the engine (gearbox mounting faces are standardized).

Each gearbox has been designed to mount and drive three large accessories—an electrical alternator, a generator, and a cabin blower. Additional but smaller faces are provided for a tachometer generator and a synchronizer alternator drive.

On the inner engines, the synchronizer alternator drive operates a hydraulic pump as well as an alternator. The final drive to each accessory is provided by a quill incorporating a safety shear neck that protects the gearbox from damage in the event of seizure or failure of an accessory.

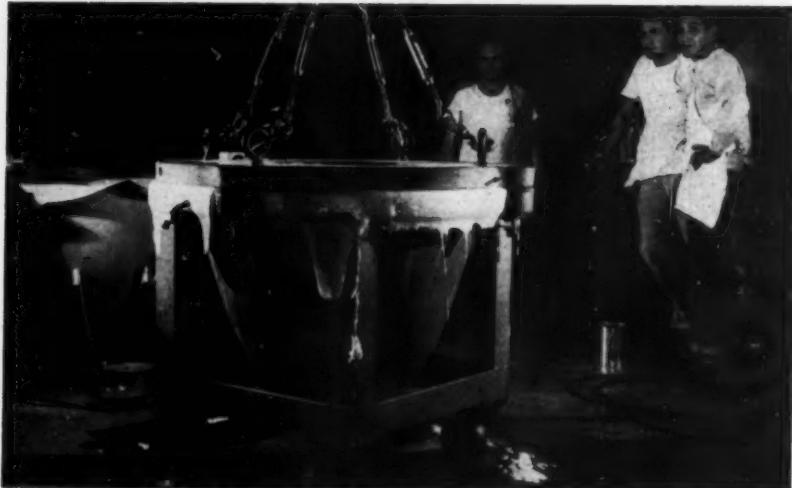


Lockheed Pours It On

A pictorial report on where radomes come from. At the bottom, steps in filling F-94C ailerons with the same lightweight foamed plastic for added strength.



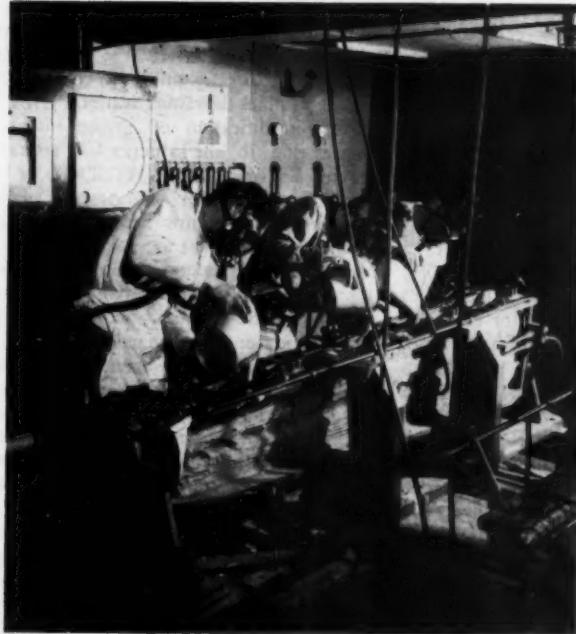
A RADOME IS POURED. Plastic goes into dies pre-heated to 120° F. so it will rise.



FOAMING PRODUCES HEAT of 200° F. as "batter" oozes out over the edge. Six hours at 200° F. are followed by two hours of cooling.



JOB DONE, the finished radome is slipped off the punch die and carefully inspected.



AILERON POURING TEAM fills up a Starfire unit with Lockfoam. Mixture starts at 120° F. unit with radome, goes to 200° F., cures seven hours.



STEAM-HEATED JACKET surrounds aileron as Lockfoam slowly cures. Above, foam protrudes from holes in the web through which it was poured.



FAMOUS NAMES and FAMOUS PLANES provide a record of safety, comfort and performance . . . unparalleled in aviation history



P904 Differential Pressure Safety Switch for cabin heaters. Stall indicators or landing gear and flap warning devices.

Deluxe Reclining Passenger Seats are designed for comfort and safety on day and night flights. Proved ruggedly durable, easy to service.

Contact the Project Engineers of our Aircraft Division for the latest data on Aerotec Controls and Aerotherm Seats.

FIELD PROJECT ENGINEERS—AIRCRAFT DIVISION

CLEVELAND 29, OHIO
J. E. Engineering Co., 5413 Pearl Rd.

ROSLYN HEIGHTS, L. I., N. Y.
John S. Hammond, Jr., 25 Edwards St.

NORWALK, CONN.
John S. Hammond, Jr., 394 West Ave.

SEATTLE 2, WASH.
Stanley R. Brett
John E. Freeman & Assoc., 1616-F 43rd St.

REG. TRADE MARK

THERMIX

DAYTON 3, OHIO
Jay Engr. Co., 1517 East 3rd St.

LOS ANGELES 43, CAL.
Fornas Engr. Co., 4545 West 62nd St.

WICHITA 8, KANSAS
J. E. Freeman & Assoc., 4913 East Lewis St.

MONTRÉAL 25, QUÉBEC
T. C. Chown Ltd., 1440 St. Catherine St. W.
Canadian Affiliates

THE THERMIX CORPORATION
GREENWICH, CONN.
PROJECT ENGINEERS

AEROTEC

AEROTHERM

HEACON

pd

Rumpus Raised by USAF Cessna Award

ANY TIME the military services hold a competition, the winning of which involves the award of an important airplane contract, there is bound to be a certain amount of dissatisfaction among the losers. The decision in one recent competition, however, has aroused more than the usual amount of grumbling.

The competition in question was an Air Force design competition for a new primary jet or turboprop trainer. It was an important one, since it represented a huge business potential; trainers do not become obsolete as rapidly as combat aircraft and the winner could count on orders and reorders for several years to come. Moreover, it afforded the winner an opportunity to develop at government expense what might become the turbine-powered lightplane of the future.

The award went to Cessna Aircraft Co. for a twin-jet design designated Model 318, which is to be powered by French-designed Turbomeca Marbore 900-pound-thrust engines, to be built in the U. S. by Continental Motors Corp. The design calls for a 5,600 pound gross weight and a top speed of more than 350 knots. It won out over 14 other studies submitted by seven other companies—Beech Aircraft Corp., Fairchild Aircraft Division, Temco Aircraft Corp., Ryan Aeronautical Co., North American Aviation, East Coast Aeronautics, and Goodyear Aircraft Corp.

Two Main Complaints

To say that the decision was an unpopular one would be to underestimate the case. Reportedly, even some Air Force officers were unhappy about it. The dissatisfaction stems from two major causes, although there are several minor angles to the story.

The major causes are, one, that a twin-engine design won, and two, that a foreign engine was selected.

In announcing the competition, the Air Force did not specify one or two engines, such decision having been left to the designer. Accordingly, most of the competitors canvassed officials of the Air Training Command, which will use the airplane. They found that the great majority of the ATC officials they contacted favored a single-engine plane and they based their designs accordingly.

ATC did not care for a twin-engine plane because of the problems involved. The trainees would have to master the two engines after only 35 hours in light pre-primary trainers. Even after mastering two-engine procedure, they would still have to learn single-engine procedure before being permitted to solo, in case of an engine failure. In addition, after completing the primary course in a twin-engine airplane, the cadets who qualified for basic training would find themselves back in a single-engined plane, the Lockheed T-33.

Nonetheless, the award went to the twin-engine design. That is half the argument; the other half concerns the approval of the Turbomeca Marbore.

Some of the competitors entered turboprop designs based on the Armstrong-Siddeley Mamba, an engine which has been thoroughly proved in Britain. But one of the factors working against the Mamba design was the fact that it is a foreign engine. It would have to be converted to U. S. standards and production started from scratch. Having had some unfortunate experiences in the

process of converting foreign engines, some of the competition analysts were less than eager to try it again.

Thus the competitors who did not make the grade were surprised to learn that a French engine had been approved as the power plant. The Marbore has never been in mass production, for one thing, and even after conversion to American standards, it will be necessary to develop production tooling. Moreover, Continental will probably need a new facility to handle quantity production of the engine.

In contrast, the great majority of the designs in the competition specified American engines either in production or for which production is planned. Some used the Fairchild J-44, now in production at the company's Engine Division, where space is available for production.

Others specified the Allison Model 520-C1, for which it is understood the Navy plans production. The 520-C1 is a pure jet version of the T38 turboprop, turning out 1,880 pounds of thrust, more than the two Turbomeca engines combined. Allison has already acquired considerable experience with the basic design as the T-38; it has floor space available; and the changeover from the turboprop design to the pure jet version requires only minor modification.

The latter also enjoys a considerable advantage over the French engine in fuel consumption rate, an important factor in an airplane which is to have an endurance of only two hours. The specific fuel consumption rate for the Model 520-C1 is 1.03 pounds of fuel per pound of thrust per hour, compared to a 1.6 rate for the Marbore. The Fairchild engine's rate is higher than that of the Marbore.

Primitive Starting

In addition, the French version of the Marbore has no accessory equipment; it must be started, for instance, by the rather primitive method of inducing air from an external source. Development of an accessory section will probably be required. But more important than that is the fact that the version now flying experimentally in France is not the version which will power the Model 318; it is, in effect, a new engine, with a higher thrust rating, that has never been built.

Those dissatisfied with the decision feel that the Turbomeca engine presents a number of problems which will delay the date at which the trainer can be put in service and that the twin-engine design will stretch the time required to solo a primary cadet.

They are puzzled and annoyed by the Air Force's conduct of the competition. Chief target of the criticism is Maj. Gen. Kenneth McNaughton, who was Director of Training of the Air Force at the time of the competition and who has since moved to Air Training Command. McNaughton, they say, "threw away the book of rules."

Cessna does not yet have a full-scale production order. The initial contract calls only for Phase I engineering work and construction of a mock-up. This will be followed by a limited order for testing and training evaluation. But plans for the trainer are huge, and it represents a considerable volume of business for several years to come. In addition, it may be the forerunner of tomorrow's jet lightplane.

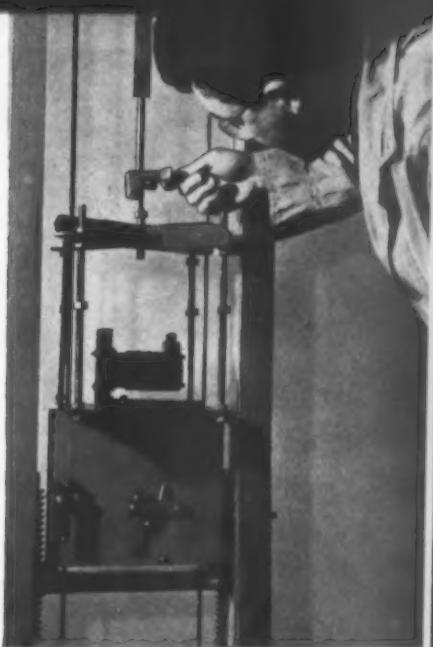
... JAMES J. HAGGERTY, JR.



VIBRATION TESTS—often for 100 hours at stresses of 50Gs—are conducted in two different positions on this machine.



HIGH TEMPERATURE TESTS in this special "oven" prove G-E tach generator endurance—at 12% over normal rpm in ambients of 194F.



SHOCK TESTS are made on G-E tach generators, starting at 50Gs. Drops are increased until maximum of 1000Gs is reached.

THESE TESTS SHOW WHY G-E TACH GENERATORS ARE STURDIER, LAST LONGER



SMA SIZE of CM-9 tach generators is evident here. Note the corrosion-resistant finish on the tempered-steel drive coupling.

At West Lynn, Massachusetts, G-E experts give new CM-9 tach generators daily tests to be sure each unit represents the finest in design and construction. These tests, along with recent engineering improvements, have led to features like:

Oilite bearings that eliminate lubrication during the life of the generator . . . a universal joint on the drive shaft that prevents binding and allows perfect alignment . . . a single-piece cast alnico rotor that cannot be damaged if generator leads are short-circuited.

The close manufacturing tolerances of CM-9 tach generators are such, that no additional calibration is needed when new installations or replacements are made.

If you're looking for a sturdy, long-life tach generator, why not investigate the advantages of General Electric's CM-9s? They are now available in two models, one for jet and one for propeller driven aircraft. For more information write Sect. 210-47 General Electric Company, Schenectady 5, N. Y.

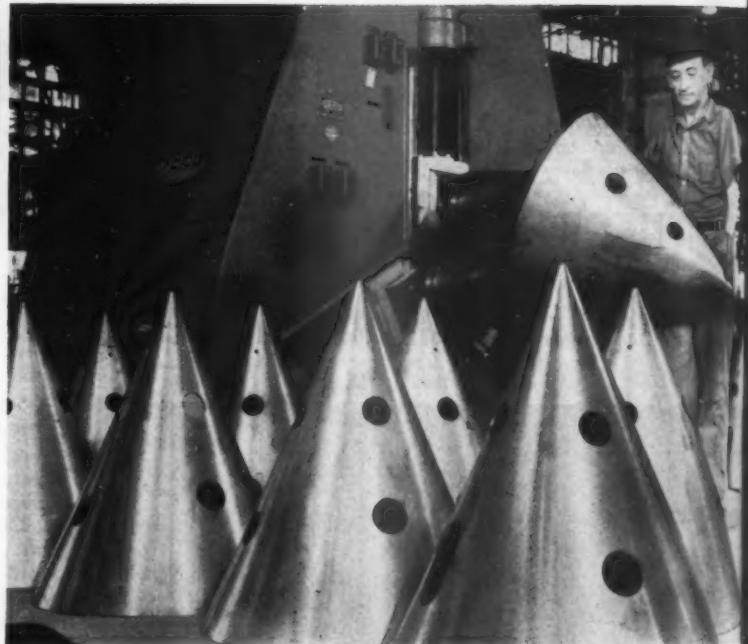
WHERE COSTS ARE A PROBLEM

G-E CM-series tach generators are now available at a very low price—for either prop synchronization/engine speed; or engine speed only. Your nearest G-E Aviation Specialist will be glad to give you complete information.

You can put your confidence in—
GENERAL  ELECTRIC



"Tilt" is the watchword in testing mercury switches. This machine does just that some 150,000 times, replacing slower manual operations. Developed by Minneapolis-Honeywell, the test rack speeds production of the switches for use in Air Force automatic pilots.

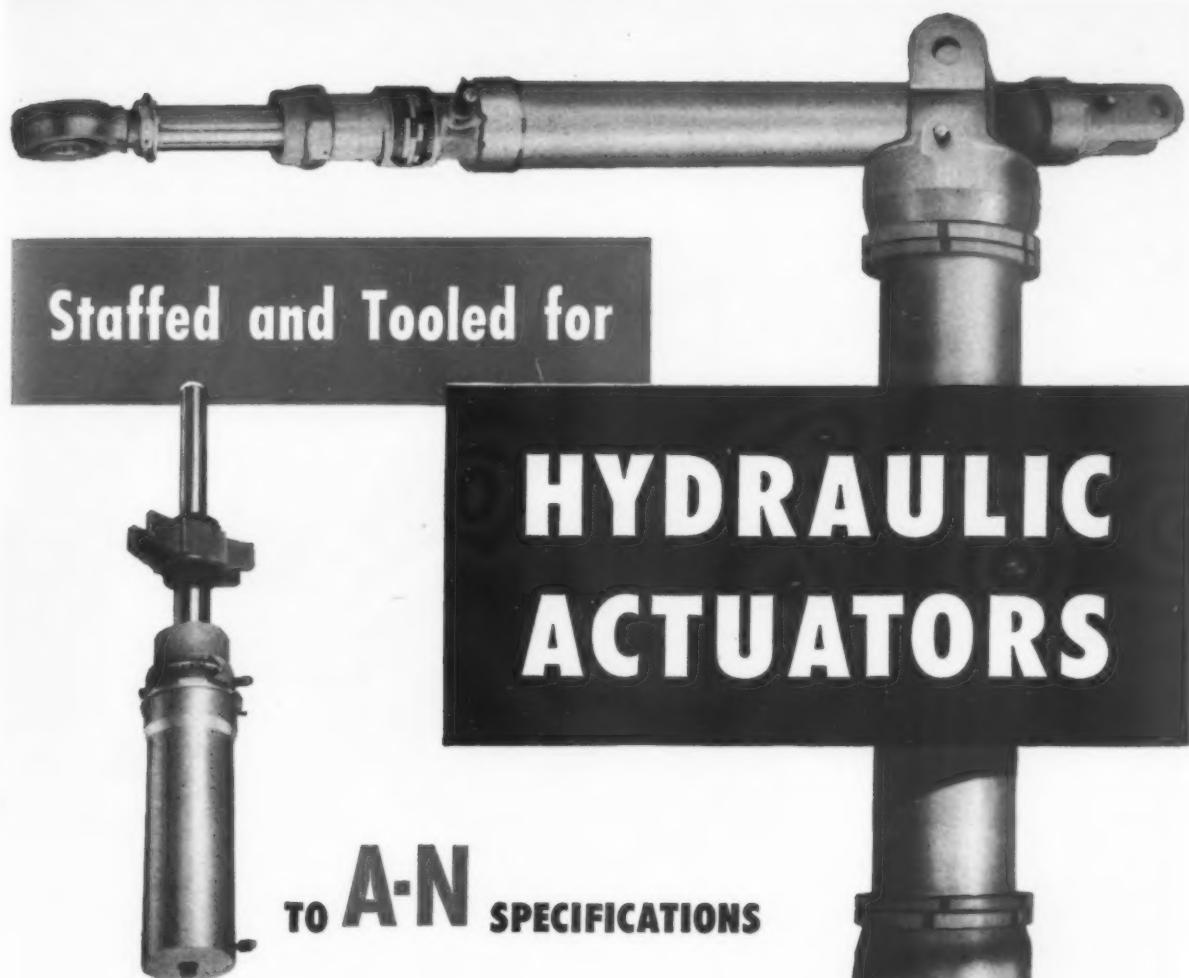


The Production Picture



Tail cones for J47 jet engines are formed at the Firestone Tire & Rubber Co., then stacked in gleaming rows. The firm also makes turbine casings and inner and outer combustion chambers.

Row on row of jet engines await shipment in metal cans. This packaging method has virtually replaced older methods of packing in wooden crates, since cans can be sealed against moisture, dirt, etc.



Breeze has the engineering staff, the shop capacity and special test equipment to produce hydraulic actuators of all types.

All engineering work, from basic specifications to final design for production, can be handled for you.

High-capacity machine tools provide low unit costs.

Special tools, such as honing machines, give finishes to the exact micro-inches required.

Breeze has all the test facilities for magnetic inspection, proof and bursting pressure tests, life cycles and other A-N standards.

LONG EXPERIENCE by Breeze with all types of actuators—rotary or linear, electrical, mechanical and hydraulic—means that your actuators are engineered, produced, tested and delivered by a firm of specialists in the field.

If you have actuator problems that call for expert attention, call on Breeze for production.

BREEZE

HYDRAULIC ACTUATORS

ANOTHER
BREEZE
MARK
PRODUCT

BREEZE CORPORATIONS, INC., 41 S. Sixth St., Newark, N. J.



Copyright by
Rand, McNally & Company,
Chicago

The thousand-mile handshake

When a company-owned Beechcraft Executive Transport is available for instant action, you and your key men find time to shake hands with field men, customers, new business prospects *regularly*. For example, you can leave at *your* convenience, cruise in

relaxing comfort one thousand miles in less than five hours, tend to business, return that day. Home office work *can't* pile up.

Thousands of executives use this soundproofed Beech "Twin" in just such fashion daily. In *your* business,

you could use more *time*. Investigate! Typical costs and operating data on request.

* * *

Call your Beechcraft distributor or write Beech Aircraft Corporation, Wichita, Kansas, U.S.A.



BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

AMERICAN AVIATION

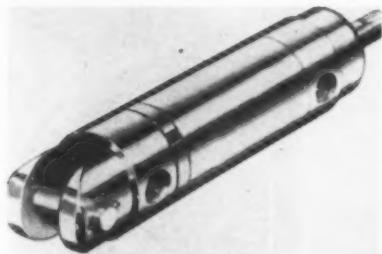
New Products

Air Velocity Measurement

An air velocity measuring instrument consisting of a battery-operated power pack and an air meter has been introduced by the Hastings Instrument Company. Suitable for portable use, the combined equipment is included in one hardwood carrying case and is intended for measuring air velocities where 110-volt power supply is not available.

The power pack includes a six-volt Hotshot battery and a converter which provides 110 volts a-c output. The air meter is a single-range, direct-reading instrument with a range from 0 to 6,000 fpm, having a logarithmic type scale for measuring very low air velocity movements. It is said to be unaffected by the length of the cable from the probe to the meter and free from errors caused by sudden temperature changes.

Address: Hastings Instrument Company, Hampton, Va.

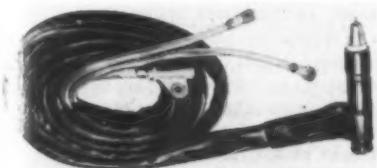


Air Cylinders

Air cylinders for application to a wide range of pushing, pulling, lifting, clamping, or control jobs in industrial plants and equipment are announced by the Tomkins-Johnson Co.

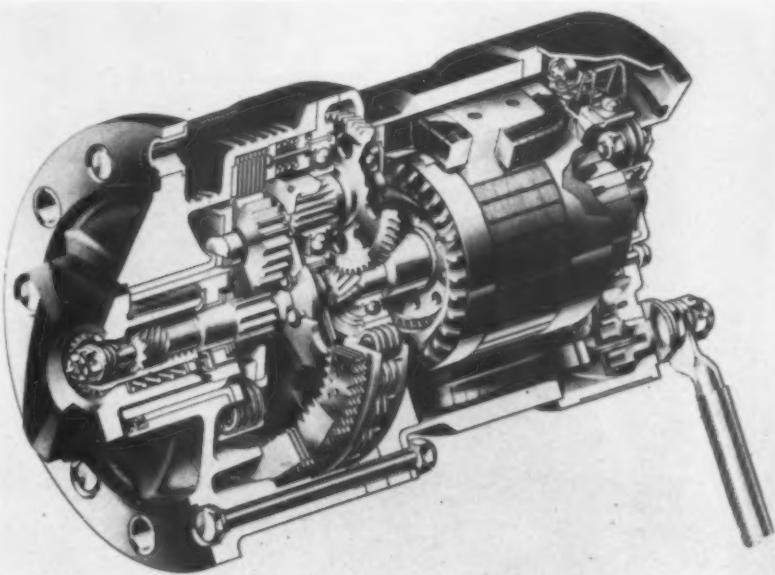
Called the T-J "Spacemaker" cylinders, the new units are said to eliminate tie rods and reduce head size, resulting in a saving of up to 40% in mounting space requirements. Features of the new cylinders include solid steel heads, heavy wall seamless steel bodies, and leakproof cylinder head-to-body construction.

Address: Tomkins-Johnson Co., Jackson, Mich.



Welding Torch

A Heliarc welding torch, light in weight and adaptable to mounting on any



New Starters

Jack & Heintz, Inc. has announced a new series of transport aircraft engine starters, the first that the company has designed to meet the specific requirements of the commercial airlines. Designated the J26C series, models are available for engines of displacement ranging from 1,000 to 4,500 cubic inches, incorporating 10 new features into the JH6 starter previously in use, including:

- Planetary gears cut from forgings instead of bar stock, offering improved strength and greater impact-absorbing characteristics.
- Sleeve bearings keyed in place to prevent loosening.
- New bearing design to prevent rotation of outer race in bearing liner.

• Chrome-plated carrying arm journal to reduce corrosion and wear.

• Silver-soldered commutator connections providing stronger construction for high-speed, high-temperature operations.

For specific engine ratings, Jack & Heintz designates these starter models:

JH6CE—2,650 to 3,500 cu. in. displacement;

JH6CF—1,000 to 2,650 cu. in. displacement;

JH6CP—2,650 to 4,500 cu. in. displacement and jaw-to-engine-crankshaft gear ratio of 3:1.

Feature of the new Jack & Heintz units is interchangeability—all parts being usable in the former JH6 series starters except the keyed sleeve bearings.

Address: Jack & Heintz, Inc., Cleveland 1, Ohio.

machine carriage that provides proper speed control for repetitive straight-line, shape, girth seam, or portable welding operations, has been placed on the market by Linde Air Products Company, a division of Union Carbide and Carbon Corp.

Specially designed gaskets used throughout the Model HW-13 torch, as it is called, prevent gas leakage and contamination by air. Its design also minimizes stub loss of expensive tungsten electrodes. Water passages, in the torch body, easily accessible for cleaning, provide efficient cooling of the torch body, welding head, and gas cup.

Range of nozzle sizes provides ample gas flow for operations using up to 500 amperes, welding current. Nozzles are replaceable without dismantling the torch.

Address: Linde Air Products Company, a division of Union Carbide and Carbon Corp., 30 E. 42 St., New York City, 17, N. Y.



Waveguides

Flexible waveguides for microwave communications systems permit compli-



here's "How"...

Small unprepared fields—even in combat zones, present few difficulties to Chase Assault Transports. Heavy duty howitzers, with crews and prime movers are delivered to front line areas **by landing** ready for immediate employment—no time lost due to unpacking or reassembly.

The Chase Assault Aircraft is the only plane designed for this specific function and has more than fulfilled the exacting requirements of military necessity.



cated bends, twists, and small radii bends with practically no change in electrical properties, according to the manufacturer, Titeflex, Inc.

Presently undergoing testing with the USAF, the "Waveflex" waveguides, as they are called, are designed for use wherever shock mounting or movement are present in equipment, where (1) connections are made between stationary and moving components, (2) flexibility of the tubing permits ease of assembly, (3) flexibility improves design, and (4) an expansion joint is needed to compensate for temperature changes and to relieve pressure on other parts of the equipment.

A rubber molded jacket offers immunity to damage under vibration and costly transmission energy is said to be conserved by silver plating the inside surfaces of Waveflex, resulting in low attenuation loss.

Address: Titeflex, Inc., 500 Frelinghuysen Ave., Newark 5, N. J.



Fuel Float Switch

A fuel float switch for single-point, high-pressure ground fueling or air-to-air refueling operations has been developed by the Revere Corporation of America. A high level fuel control instrument which provides automatic cut-off control, the Revere float switch can be supplied with single- or dual-level systems.

In operation each system provides an electrical signal through a magnetically operated switch which is hermetically sealed in a glass tube. The operating magnet is incorporated in the counter-weight of a statistically balanced float assembly. The actuating magnet, positioned by the float, opens or closes the switch at a level which is pre-set at the factory.

Address: Revere Corporation of America, Dept. 12, Wallingford, Conn.



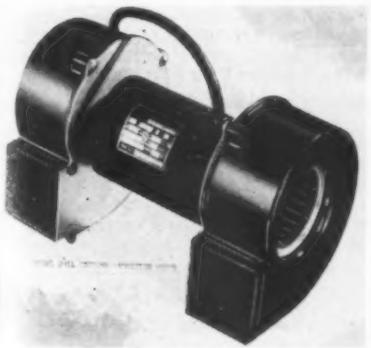
Fuel Pump

A continuous duty electrically driven fuel pump for aircraft heating and deicing systems has been placed on the market by Lear, Romec Division. Of the positive displacement, non-pulsating, rotary vane type, the Model RG-9540, as it is designated, has a rated capacity of 35 gph at 25 psi discharge with 20" Hg. absolute inlet pressure.

Motor features include 27 volt dc power requirements, continuous duty operation, compound winding, 3.5 amp rating, explosion resistant design, fan cooling, and built-in radio interference filtering.

Driven by a 0.06 hp motor with direct drive at 3,700 rpm, the new pump weighs 3.4 pounds and is approximately 7 1/3" long. An adjustable, balanced type relief valve maintains uniform discharge pressure from sea level to 40,000 feet. By-pass provisions are included and the design provides for use with straight aviation gasoline and high aromatic blends.

Address: Lear, Inc., Romec Division, Elyria, Ohio.



Induction Motor

An induction motor for micro-wave relay equipment and other electronic installations is announced by Howard Industries, Inc. Designated the model 2914 CYCLOHM, the new motor is rated from 1/100 to 1/15 hp and operated at 1,650 rpm with an input voltage of 90-120 volts. Of the self-ventilated type, the model 2914 is available with either ball or sleeve bearings. Air delivery of the double bearing is 37 cfm, each head at 95 volts a-c.

Address: Howard Industries, Inc., 1760 State St., Racine, Wis.

DELTA MEANS

Deluxe DC-6 Service TO MIAMI

All Seats in Pairs

NON-STOP
from CHICAGO
4 HOURS
15 MIN.

NON-STOP
from CINCINNATI
3 HOURS
25 MIN.

NON-STOP
from ATLANTA
2 HOURS
15 MIN.

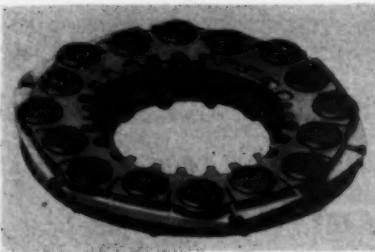


General Offices: Atlanta, Georgia

Haiti is
most co
Ciudad
very n
delig
favo
tour
mou
po
ca
s
t



CHICAGO & SOUTHERN AIR LINES



Brake Lining

A Cerametallic brake lining produces approximately five times the service life of conventional resin-base linings and permits increases in brake energy ratings in the order of 50%, according to the Bendix

Aviation Corporation, Bendix Products Division. Said to have functioned successfully at temperatures up to 2000° F., the ceramic-base lining is being produced in disc form for the Bendix segmented rotor brake.

Featured with the new lining is a revised method of disc retention, requiring no rivets or bonding process and permitting delining with simple hand tools. On the back of each disc a projecting button extends through the hole in the brake stator (see photo), and into a mating button on the disc on the opposite side. By pressing the discs together, one attachment device expands within the other, holding the two discs securely together.

Address: Bendix Aviation Corporation, Bendix Products Division, South Bend 20, Ind.

Technical Literature

AMPLIFIER BRIDGE. Complete design data on a new lightweight amplifier bridge for the Pacitron fuel gage system is contained in a four-page folder being offered by Simmonds Aerocaries, Inc., White Plains Rd., Tarrytown, N. Y.

LUBRICANT. Bulletin 96, a two-color brochure, describes Molykote-Type A, lubricant used for aiding in overcoming the energy waste in internal combustion engines and was prepared by the Alpha Corp., 179 Hamilton Ave., Greenwich, Conn.

TRUCKS AND CRANES: The Baker-Raulang Co., 1230 W. 80th St., Cleveland 2, O. utilizes an eight-page catalog to describe and illustrate its line of industrial trucks and cranes.

MAGNETIC ALLOYS. Hipernik, Hipernik V, Conpernik, iron-nickel alloys and Hiperco, an iron cobalt alloy, are explained in an eight-page booklet, TD-52-100, put out by Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

TESTING MACHINE: Baldwin Bulletin 4202 presents within its four pages details on a new model FGT Baldwin-Emery SR-4 testing machine of 50,000 lb. capacity, and is available from Baldwin-Lima-Hamilton Corp., Philadelphia 42, Penna.

CORROSION RESISTANT SEAL. Toruseal, a torus, fabricated from metallic tubing, developed by The D.S.D. Manufacturing Co., 2964 Whitney Ave., Hamden, Conn., is described in a four-page bulletin which includes suggested applications, i.e., aircraft and diesel engines.

POWER SUPPLIES. A four-page, two-color folder describes the Kepco Laboratories, Inc., 131-38 Sanford Ave., Flushing 55, N. Y., line of voltage regulated power supplies.

PORTABLE TACHOMETERS: Technical Data Sheet No. 48HJK presents the purpose, applications, features, and description of Type 48H, J and K portable tachometers with $\frac{1}{4}\%$ accuracy, spread scale, and hand engagement, designed by Metron Instrument Co., 432 Lincoln St., Denver 9, Colo.

PHOTO CREDITS

- Cover: Ankers
- 9—British Information Services
- 10—CAA
- 11—USAF
- 13—USAF
- 14—USAF; North American; Martin
- 15—CAB
- 24—Marquardt
- 29—Boeing
- 32—Douglas
- 34—Flying Tigers
- 37—Ankers
- 50—Lockheed
- 54—Minn.-Honeywell; Firestone
- 61—Pioneer Air Lines
- 73—Lockheed; Fairchild

Business in STOCKHOLM?

**VISIT THESE
EXTRA
CITIES**

at No Extra Fare!

Get a bonus of business trips to other cities, relax in Paris. Or visit Amsterdam and Brussels. You get all this via S-A-S for the Stockholm fare alone. Stop over for days or months. No lower fare, no finer service.

WRITE for new brochure showing S-A-S bonus "extra-city" trips to all Europe.

Only \$539.60 round trip
Tourist thrift season fare.
Nov. 1—March 31

S-A-S
SCANDINAVIAN AIRLINES SYSTEM
30 Rockefeller Plaza, New York City, N. Y.
or your travel agent

WORLD'S PREMIER AIRPLANE FABRIC

lighter **stronger** **smoother**

FLIGHTEX

FLIGHTEX FABRICS, Inc. • 93 WORTH STREET • NEW YORK 13, N.Y.

Leading Manufacturers of
Fabric and Tapes for the
Aircraft Industry.

FLIGHTEX FABRIC

Export Representative
AVIQUIPO, Inc.
25 Beaver Street, N. Y.
Cable: Aviquipo

People

ADMINISTRATIVE

William R. Rivers, formerly executive assistant to **Orvis M. Nelson**, president of Transocean Air Lines, has been elected president of Oakland Aircraft Engine Service, Municipal Airport, Oakland.

Gene Beck has been named vice president in charge of engineering for GAVCO Corporation, a subsidiary of General Aviation Corp. Beck was formerly chief engineer and general manager of Topper Manufacturing Company.

Sam R. Donaldson has been appointed superintendent of the newly formed aircraft division of Enamel and Heating Products, Ltd., Sackville, N. B.

W. L. Van Horn has joined the aircraft division of Kaiser-Frazer Corp. as administrator of estimating. Van Horn was previously supervisor of master scheduling at Consolidated Vultee's San Diego plant.

R. W. Conkle is the new works manager of Aircooled Motors, Inc. Prior to his recent promotion, Conkle was the firm's factory manager, a position he held since 1947.

Clinton B. McKeown has been appointed superintendent of the aeronautical manufacturing division of the B. F. Goodrich Company. McKeown moves to the new post from his former posi-

tion as technical superintendent of the division.

John S. Liefeld has been named factory manager of Marquardt Aircraft Co., Van Nuys, California. Prior to joining Marquardt, Liefeld was with Aircraft Metal Forming Co. of Burbank.

Stanley Bogaczyk is the new assistant director of industrial relations for the Curtiss-Wright Corporation.

William Looney, United Air Lines, has been named district personnel manager for the company at Los Angeles.

OPERATIONS-ENGINEERING

William L. Greene has been appointed vice president-engineering and general manager of the Engineering and Research Corp., Riverdale, Md.

John Silver, formerly general manager of the communications and electronics division of Motorola, Inc., has been promoted to vice president in charge of operations of the division.

R. H. Bendio is the new director of maintenance and engineering for North Central Airlines. Bendio comes to North Central from Empire Airlines where he held a similar position.

Samuel T. Peters has been named chief pilot for Pan American World Airways' Pacific-Alaska Division.



Importance of interline sales was stressed at Pioneer Air Lines' 1953 sales meeting, which was attended by 19 representatives of 14 other airlines. In 1952, Pioneer gave other carriers \$1,285,857 worth of business, and received from these lines \$750,640. Among those attending the meeting were, left to right: Jim Beck, interline and agency sales, Trans-Texas Airways; Rodger Meier, C&S Dallas sales manager; Fred Cox, TWA's Amarillo reservations manager; Jake Hoffman, Eastern's Houston sales manager; Mike Cook, assistant to Frontier's general traffic and sales manager; Elmo Coon, American's regional sales director in Dallas; Ed Whitney, Western's interline sales manager in Cheyenne; Bill Cann, Air France's Dallas sales manager; Dick Ellis, Frontier's Albuquerque sales manager, and M. D. (Doc) Miller, American's southern regional vice president, Dallas. Not shown are representatives of Delta, National, United, Braniff, Pan American, and SABENA.

Wherever You Are

in the United States



You can obtain up-to-date
factory parts for
your Pratt & Whitney
Aircraft engines...
quickly and easily

Check the authorized Distributor
of Pratt & Whitney Aircraft
parts nearest you

PACIFIC AIRMOTIVE CORPORATION

Lockheed Air Terminal
Burbank, California

Oakland Municipal Airport
Oakland, California

Boeing Field, Seattle, Washington

SOUTHWEST AIRMOTIVE COMPANY

Love Field, Dallas, Texas

NORTHWESTERN AERONAUTICAL COMPANY

Holman Field, St. Paul, Minnesota

AIRWORK CORPORATION

Millville Municipal Airport
Millville, New Jersey

36th Street (Opposite International
Airport) Miami, Florida

PACIFIC AIRMOTIVE CORPORATION

Linden Municipal Airport
Linden, New Jersey

These leading firms maintain adequate
stocks of approved parts for current Pratt
& Whitney Aircraft engines.

Always insist on up-to-date factory
parts—they'll assure you of maximum
engine performance.

Pratt & Whitney
Aircraft

One of the four divisions of
United Aircraft Corporation

EAST HARTFORD, CONNECTICUT



Summary of U. S. International Air Traffic for October, 1952

AIRLINES	REVENUE PASSENGERS	REVENUE PASSENGER MILES	AVAILABLE SEAT MILES	PASSENGER LOAD FACTOR	U. S. MAIL TON-MILES*	FOREIGN MAIL TON-MILES	EXPRESS TON-MILES	FREIGHT TON-MILES	TOTAL TON-MILES	REF. TRAFFIC	AVAILABLE TON-MILES FLOWN	% AVAILABLE TON-MILES USED	REVENUE PLANE-MILES	SCHEDULED MILES	% SCHEDULED MILES COMPLETED
American	9,359	6,677,000	10,253,000	65.12	15,349	4,485	492	173,722	899,791	1,440,012	62,48	238,851	219,961	99.50	
Braniff	2,958	7,056,000	15,732,000	44.86	40,046	5,876	...	80,173	905,278	2,223,767	40,71	364,317	365,438	99.69	
C & S	2,174	2,835,000	6,442,000	44.03	5,153	964	...	101,462	404,822	891,898	45.39	139,560	143,902	96.98	
Colonial	2,998	3,232,000	3,283,000	71.03	1,706	385	...	6,612	254,851	394,251	64.64	63,345	49,861	99.14	
Eastern	8,153	11,513,000	22,281,000	51.02	41,010	...	...	46,254	1,250,296	3,551,701	35.20	373,987	378,771	97.87
National	6,798	1,721,000	3,610,000	47.33	1,309	3,076	16,527	197,058	473,882	41,58	62,784	65,100	95.80		
Northwest	6,223	10,831,000	19,117,000	56.57	113,904	44,610	20,811	690,291	2,030,511	3,051,191	66.55	496,836	497,335	95.11	
Panagra	10,189	10,610,000	19,965,000	54.14	32,329	29,364	...	185,020	1,465,089	2,707,628	54.11	503,747	496,781	99.79	
PA															
Latin Am.	99,120	99,677,000	98,648,000	60.50	273,315	63,557	...	2,07,862	8,386,916	13,680,353	61.33	2,215,667	1,797,499	95.76	
Atlantic	aa	97,097,000	96,448,000	60.45	497,913	124,527	...	1,139,200	7,850,119	12,852,791	61.08	1,679,934	1,754,282	93.33	
Pacific	8,206	29,583,000	45,114,000	65.57	340,799	59,343	...	607,567	4,265,762	7,644,005	55.83	900,101	901,166	99.88	
Alaska	4,597	5,115,000	11,360,000	45.03	34,551	...	...	494,364	1,061,201	1,689,487	62,83	260,662	259,407	98.84
TWA	16,011	39,081,000	63,909,000	63.15	226,202	136,895	...	600,782	5,341,677	7,336,642	72.83	1,403,591	1,350,147	98.06	
United	4,443	11,273,000	13,836,000	81.59	63,948	...	...	49,454	1,303,431	1,830,408	71.21	265,050	262,990	96.10
TOTALS	141,392	255,593,000	428,005,000	59.72	1,785,535	470,014	24,379	6,677,288	35,617,097	59,768,014	59.59	8,968,232	8,542,639	96.76	
Braniff (Sept.)	3,425	8,133,000	15,655,000	51.95	37,836	5,825	...	111,466	1,053,218	2,165,833	48.63	354,579	354,789	99.94	
Figures for Braniff Not Previously Reported															
* Includes air parcel post.															
** Figures not available.															
NOTE: Figures include both scheduled and non-scheduled operations.															
2. Eastern's Scheduled Miles and 1 Scheduled Miles Completed, which were not published in July, August and September are as follows: July: 263,75 scheduled miles; 99.39 % completed. August: 30,50 scheduled miles; 96.80 % completed. Sept.: 352,011 scheduled miles; 99.37 % completed.															

Summary of U. S. Local Service Airline Traffic for October, 1952

AIRLINES	REVENUE PASSENGERS	REVENUE PASSENGER MILES	AVAILABLE SEAT MILES	PASSENGER LOAD FACTOR	MAIL TON-MILES	EXPRESS TON-MILES	FREIGHT TON-MILES	TOTAL TON-MILES	REF. TRAFFIC	AVAILABLE TON-MILES FLOWN	% AVAILABLE TON-MILES USED	REVENUE PLANE-MILES	SCHEDULED MILES	% SCHEDULED MILES COMPLETED	
All American	18,702	2,722,000	5,722,000	47.48	5,538	11,989	...	276,327	652,805	42,33	272,002	263,561	98.37		
Braniff	4,920	1,215,000	3,019,000	40.25	2,579	2,046	3,025	123,721	399,186	30,99	143,762	142,694	99.68		
Braniff*	6,023	942,000	1,997,000	47.17	1,868	3,079	5,423	100,085	199,702	50,12	83,209	83,164	99.96		
Central	5,057	692,000	3,362,000	20.58	2,696	1,175	2,440	72,205	384,161	18,80	160,187	159,846	99.59		
Frontier	12,214	3,334,000	8,493,000	39.27	8,839	6,156	38,506	372,629	807,576	46,02	407,526	389,980	99.61		
Lake Central	3,261	513,000	1,701,000	30.16	1,205	5,195	...	52,691	196,294	26,84	81,960	78,492	98.72		
Mohawk	14,402	2,663,000	8,645,000	47.17	3,628	6,923	6,360	255,990	572,924	44,68	235,277	217,360	97.17		
N. Central	17,118	2,931,000	6,804,000	43.01	9,953	16,025	...	304,252	778,747	28,89	324,478	336,350	96.46		
Omair	10,404	1,776,000	6,158,000	28.85	3,544	6,639	...	176,355	540,602	32,62	246,286	243,428	99.62		
Piedmont	21,514	4,540,000	9,922,000	45.76	7,570	11,738	17,971	473,407	1,133,926	43,57	472,699	477,794	98.44		
Pioneer	18,046	4,991,000	11,570,000	43.14	11,285	4,209	15,585	507,846	1,124,820	45,12	321,377	327,998	97.79		
Southern	11,966	2,017,000	6,164,000	32.72	7,447	8,082	...	208,687	667,927	33,24	293,530	297,496	98.12		
Southwest	15,522	3,001,000	5,292,000	56.71	7,613	4,136	9,264	307,425	604,752	50,83	251,980	262,236	95.14		
Trans-Texas	8,062	1,793,000	5,107,000	35.11	5,692	3,547	8,789	188,849	583,763	32,35	243,226	238,948	99.99		
West Coast	14,263	2,505,000	5,776,000	43.37	2,824	3,176	3,165	231,678	524,437	45,04	276,999	293,322	93.59		
Wiggins	332	34,000	163,000	20.86	103	183	...	3,325	17,430	19,08	42,887	48,066	85.02		
TOTALS	182,111	35,659,000	86,894,000	41.04	82,386	94,568	...	110,428	3,652,100	9,179,032	39.79	3,855,157	3,858,733	97.77	
HAS Los Angeles	...	...	...	...	2,393	...	...	2,393	6,121	39.09	30,221	30,221	100.00
* Figures cover operations of local service route 106 now operated by Braniff Airways as result of Braniff-NCA merger, effective Aug. 16, 1952.															
# Formerly Wisconsin Central Airlines. Change in name was effective December 16, 1952.															
NOTE: Above figures include both scheduled and non-scheduled operations.															

Summary of U. S. Local Service Traffic for November, 1952

AIRLINES	REVENUE PASSENGERS	REVENUE PASSENGER MILES	AVAILABLE SEAT MILES	PASSENGER LOAD FACTOR	MAIL TON-MILES	EXPRESS TON-MILES	FREIGHT TON-MILES	TOTAL TON-MILES	REF. TRAFFIC	AVAILABLE TON-MILES FLOWN	% AVAILABLE TON-MILES USED	REVENUE PLANE-MILES	SCHEDULED MILES	% SCHEDULED MILES COMPLETED	
All American	12,218	1,819,000	4,936,000	36.85	4,500	9,534	2,560	187,415	564,118	33,22	235,049	258,286	86.34		
Braniff	4,298	1,058,000	2,778,000	38.07	1,982	1,947	2,553	107,671	367,693	29,28	132,263	135,396	97.69		
Braniff*	4,682	882,000	1,701,000	51.85	1,584	2,270	2,985	90,920	177,492	33,22	73,955	80,400	91.98		
Central	3,722	511,000	3,180,000	16.07	2,435	1,181	2,024	54,406	363,394	14,97	151,414	155,340	96.92		
Frontier	10,710	2,818,000	7,813,000	36.07	8,840	6,294	31,410	315,254	743,950	42,38	373,555	377,400	96.82		
Lake Central	2,614	424,000	1,655,000	25.62	1,124	5,180	1,553	47,124	193,128	24,40	80,638	75,960	97.63		
Mohawk	10,315	1,795,000	4,687,000	40.00	2,433	5,253	4,856	176,413	455,979	38,69	136,946	183,719	91.88		
N. Central	12,248	2,023,000	4,785,000	42.28	7,935	12,159	...	203,270	645,324	31,36	269,295	322,560	83.49		
Omair	8,852	1,510,000	5,729,000	26.36	2,968	5,651	...	149,827	503,004	29,79	229,159	233,640	96.36		
Piedmont	18,097	4,033,000	9,356,000	43.11	6,872	10,423	11,822	414,826	1,069,267	38,80	445,528	453,787	97.51		
Pioneer	15,104	4,110,000	10,875,000	37.79	10,425	3,549	12,728	419,180	1,057,263	39,65	402,075	309,852	96.55		
Southern	10,029	1,777,000	5,521,000	32.19	6,620	6,012	...	182,682	598,331	30,53	262,045	266,105	97.25		
Southeast	14,051	2,723,000	5,169,000	52.68	7,041	3,516	7,338	277,342	596,330	46,54	246,161	251,256	97.32		
Trans-Texas	6,719	1,507,000	4,645,000	32.45	5,163	2,786	7,144	158,663	532,946	29,77	222,063	231,240	94.43		
West Coast	9,829	1,822,000	5,165,000	35.27	2,489	2,782	2,385	169,494	459,932	36,85	245,953	287,860	86.42		
Wiggins	176	18,000	108,000	16.66	56	138	...	1,839	11,540	15,94	28,287	45,365	59.65		
TOTALS	143,664	28,630,000	77,903,000	37.01	72,167	78,400	86,835	2,956,526	8,339,689	35.45	3,685,284	3,664,466	93.29		
HAS Los Angeles	...	...	...	...	1,857	...	...	1,857	4,731	39.25	23,425	24,976	93.79
H.Y. Airways	...	...	...	...	3,607	...	...	3,607	8,915	40,46	21,689	22,891	99.08
H.Y. Airways															
* Figures cover operations of local service route 106 now operated by Braniff Airways as result of Braniff-NCA merger, effective Aug. 16, 1952.															
# Formerly Wisconsin Central Airlines. Change in name was effective December 16, 1952.															
\$ Began operations October 15, 1952.															
NOTE: Above figures include both scheduled and non-scheduled operations.															

How electronic "runways in the sky" aid United Air Lines dependability

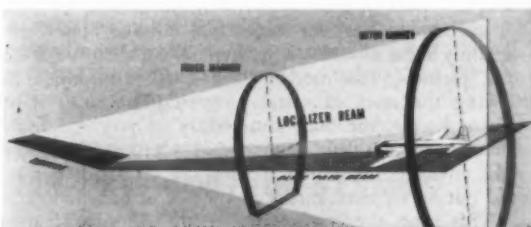


1. "UNITED 612, THIS IS APPROACH CONTROL. You are cleared for an ILS approach." Thus, an air traffic expert in the airport control tower gives your Mainliner Captain the radio go-ahead to come in for a landing.



2. HERE'S YOUR MAINLINER[®], still miles away from the airport . . . above a cloud layer that obscures vision below. A few years ago this condition might have closed the airport to all

traffic. But today your United Air Lines landing will be routine on Instrument Landing System (ILS), an accurate electronic "runway" through the clouds to the airport.



3. ILS WORKS THIS WAY: An electronic glide path beam slants up from the runway at the correct angle for descent. A localizer beam transmitted into the approach area marks the center line of the runway. And vertical radio markers on the approach flash signals in the cockpit telling distance from the end of the runway.



4. GUIDING HIS MAINLINER so that both needles on this cockpit instrument stay centered, your United Air Lines Captain knows that he's "on the beam."



5. ON THE GROUND at major airports, Precision Approach Radar operators watch the plane's approach on their radar screens, making sure there is no deviation from the "on course" line throughout the plane's descent.

For reservations call or write United
or an Authorized Travel Agent



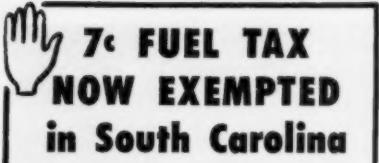
COMPARE THE FARE AND
YOU'LL GO BY AIR

COPR. 1953 UNITED AIR LINES



6. YOUR CAPTAIN has approached on ILS with the ease and sureness of clear weather flying. Emerging from the cloud layer at least 300 feet above the ground, perfectly lined up with the runway, he makes his landing and

is cleared to the parking area for an "on time" arrival. ILS has proved itself in millions of routine landings. Because of this and similar advanced techniques, you enjoy schedule dependability *in all seasons* on United.



**REFUEL WHERE
PRICES ARE LOWEST!**

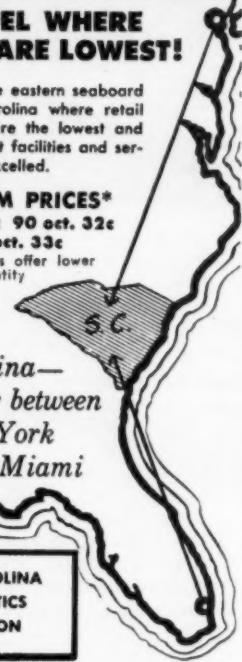
Refuel on the eastern seaboard in South Carolina where retail fuel prices are the lowest and where airport facilities and service are unexcelled.

MAXIMUM PRICES*
80 oct. 31c 90 oct. 32c
100 oct. 33c

*Many dealers offer lower prices on quantity purchases.

**South
Carolina—
Midway between
New York
and Miami**

**SOUTH CAROLINA
AERONAUTICS
COMMISSION**



**HOME OF THE FAMOUS
Hawaiian Room
THE PERENNIALLY POPULAR
NEW YORK ADDRESS**



Hotel Lexington

CHARLES E. ROCHESTER, President
George W. Miller, Manager

LEXINGTON AVE. AT 48th ST., N.Y.C. 17

Airline Commentary

By Eric Bramley



HERE'S a remarkable coincidence—and a testimonial for AMERICAN AVIATION. Art Clayton, TWA's manager of employe publications, writes that he goes through the magazine from cover to cover every night until a new copy arrives. "Why? Simply because my 2½-year-old son, Bruce, insists on looking at the airplane pictures. . . . He calls it his 'airplane book' and trots it out at the slightest provocation."

One day after Art's letter was received in this office, another one arrived from Parke Wright, former sales manager for National Airlines and now with Lyke Brothers, Inc., meat packers in Tampa, Fla. Referring to his 2½-year-old son, he writes: "Have you ever heard of a little boy who wouldn't go to bed at night unless his daddy brought him the 'airplane book,' AMERICAN AVIATION?"

One letter was written within a day of the other, both sons are 2½, both call the magazine their "airplane book" and both look at it before going to bed. Quite a series of coincidences. We start our readers young.

American Airlines sends us advance proofs of 10 advertisements that are to appear shortly in national magazines. The ads represent a new approach, covering some of the pioneering that American has done. They'll feature the sleeper plane, air travel plan, Magnaflux, introduction of the DC-3, family plan, Magnetronic Reservoir, and others. It's a darned good series. Watch for it.

It's unusual to find an air-minded banking institution, but the State Street Trust Company in Boston certainly rates as one. At its Federal Street office it has a collection of aviation prints, pictures, and models. It has, for air-minded depositors, a special check showing the story of aerial progress. The cover of its 1952 year-end financial statement honors the 50th anniversary of powered flight.

And now Ralph Eastman, vice president, has sent a memo to the bank's officers and department heads, advising them that if they use air mail, but not air mail stationary, they should put an air mail sticker at the top of each letterhead as well as on the envelope. "This gives the correspondence the priority of attention it deserves when it reaches the desk of the recipient in case his mail is opened by someone else before it gets to him," he said.

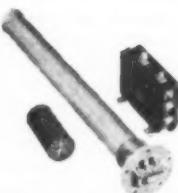
We'd say that the State Street Trust Company is doing its bit to convert people to the use of air travel and air mail.

From Pan American World Airways comes the story of a group of passengers aboard a Connie. Only one of them spoke any English, so he was acting as interpreter—asking the purser questions and passing on the answers to his friends. "Howa high issa da airplane?" he asked. The purser told him it was at 17,000 feet. Very much impressed, the passenger came back with, "You donta say! Well, tella me—how wida is it?"

We were fortunate enough to win another award this year in TWA's annual aviation writing competition (Bill Henzey and Jim Haggerty, of our staff, also won, giving AMERICAN AVIATION a clean sweep in the technical writing class). As usual, the awards were presented in Phoenix, Ariz., where TWA takes the winners (plus travel writers and other journalists) on a special flight. We have now been on four of these flights, and are increasingly impressed with the hard work that goes into organizing them. TWA, the Phoenix Chamber of Commerce, resort owners, and others cooperate to make the trip go off without a hitch. Special mention goes to Gordon Gilmore, TWA's vice president-public relations, and his staff, Robby Robinson, TWA's sales promotion manager, and Bobby Burns, of the Phoenix Chamber.

MAKE SIMMONDS YOUR SOURCE

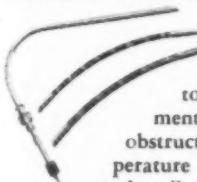
FOR ADVANCED AIRCRAFT ACCESSORIES



THE NEW SIMMONDS PACITRON ELECTRONIC FUEL GAGE

More than twenty U.S. and foreign airlines are equipped with Simmonds electronic fuel gages. Now available is the new lightweight Pacitron system with the miniaturized amplifier-bridge — lightest and most compact unit of its type available. The reliability and rugged service which have uniformly characterized Simmonds gages have established their leadership in the field of electronic fuel gaging.

SIMMONDS PRECISION PUSH-PULL CONTROL SYSTEMS



Simmonds controls are positive, precise and versatile. Adaptable to the most complex requirements, such as bends around obstructions, operation under temperature extremes, precise control under vibration. Typical applications are operation of pressurized door controls, propeller governors, parking brakes, etc. Write for complete design manual.

As recognized leaders in the design and manufacture of precision electronic, mechanical and hydraulic equipment, the Simmonds development group presents a growing line of advanced products, proven to the latest specifications of the U.S. aircraft industry.



STRONG LIGHTWEIGHT COWLING LATCH

In weights of only 6 oz. and 8 oz. withstands 7,000 lbs. in both tension and shear. Flush-fitting. Cowling pull-up adjustment. Simple construction — just housing and toggle. For hinged or detachable panels. Accommodates principal cowling curvatures. Send for data sheet.

HIGH STRENGTH ACCESS LATCH

Weighs only 3.2 ounces, yet takes ultimate load of 2,700 lbs. tension, 5,000 lbs. shear. For panels, cargo doors, radomes and similar surfaces. Pull-up and adjustment features. Flush when installed; gives positive lock, yet unlocks with finger pressure. Only two parts, toggle action.



HYDRAULIC FUSE

This quantity measuring fuse acts as an automatic shut-off for aircraft hydraulic systems. It closes whenever more than a predetermined amount of liquid passes through the line.

Look to Simmonds for the Finest
in Advanced Air Accessories



Manufacturers of
Specialized Electronic,
Mechanical and Hydraulic
Equipment for Aircraft

MANUFACTURING PLANTS
BRANCH OFFICES

SIMMONDS

AIRCRAFT ACCESSORIES, INC.
TARZETTOWN, WIS.

Manufactured in the United States of America
1. Aerocessories Division, Inc.
2. Aerocessories Division, Inc.
3. Aerocessories Division, Inc.



New flight departure board

has been installed by Delta Air Lines in the Atlanta passenger terminal. Over 13 ft. long by 3 3/4 ft. high, the board shows the numbers of departing flights together with their gate positions. It is remotely controlled by push buttons from the operation coordinator's desk. Designed and constructed by Delta's engineering and maintenance departments, the board is essentially a plywood box fitted with opaque white plexiglas front panels on which the numbers have been outlined in such a way that they appear in vivid yellow when the backlighting, consisting of yellow fluorescent tube lights, is activated. The board can take care of 14 flights simultaneously and is so designed that panels can be removed and various flight groupings installed in order to cover a full 24 hours.

Passenger Handling Made Easy

New central space control

system now in operation at Western Air Lines' Los Angeles headquarters is expected to increase reservations traffic capacity by 10% while eliminating up to 90% of teletype messages at high-volume cities. System controls 39 flights on the coast and eastward to Salt Lake City and provides reservations agents with confirmed seating space in a matter of seconds. Washable Masonite flight panel is 6' high and 27' long and is marked off in 5,412 squares 2 inches by 2 inches. Alternate beige- and sand-colored bands provide easy-vision checking on any flight for 30 days in advance from any one of 12 agents' desks in the center. Plastic flight numbers and city code numbers are in primary colors, easily read against the neutral background. Markers fashioned from colored golf tees and squares of clear, colored plastic indicate space still available. Space control center is connected to WAL sales and reservations offices by two teletype circuits. Photo shows first message being sent by Marvin Landes, vice president-service. Center was designed by the passenger service department under Jack Slichter (standing at Landes' shoulder).



Split Victory For PAL In Examiner's Report

Pioneer Air Lines' plea for government mail pay support for new Martin 2-0-2 operations was upheld recently by CAB Examiner William J. Madden. If adopted finally by CAB, it could mean that local service lines could turn to postwar aircraft with the assurance of government financial support.

But Madden's recommendation in the Pioneer case was not an all-out victory for the local service line. First, he said, eight 2-0-2's and not nine as operated by the company could provide sufficient capacity. Second, and perhaps more significantly, he urged that the profits realized by Pioneer from the sale of its DC-3 fleet to the U. S. Air Force should be off-set against the first year's mail pay need for the 2-0-2 operation.

Pioneer's petition for higher mail pay was objected to by CAB's Air Operations Bureau, which felt the company should continue to receive the lower DC-3 rate. But Madden said the equipment switch, made last June, "meets the standards of honest, economical, and efficient management."

On the sale of DC-3's to the Air Force, Madden figured Pioneer's profit to be \$945,537. This would, on the offset theory, cut Pioneer's first year rate to 19.42 cents per revenue-mile. Thereafter, the company's rate would be about 47.51 cents.

Eight Lines Considered For NY/CHI Service

The Civil Aeronautics Board is going to consider applications for additional service in the New York-Chicago area. Wholly apart from a current case dealing with Cleveland-New York nonstop services, the new proceeding initially is concerned with 12 applications of eight scheduled carriers: Braniff, Capital, TWA, American, Colonial, Chicago & Southern, Northwest, and United.

A conference was scheduled in Washington for January 30 to consider pending and possibly new applications for the service, which CAB Chief Examiner Francis W. Brown said should "insofar as possible . . . be restricted to cities south of Buffalo and north of Pittsburgh and on a route terminating in Chicago and New York."

The issue of New York-Chicago service was recently involved in the reopened Milwaukee-New York Restriction Case, but, to expedite the "pressing" issue of Cleveland-New York non-stop service, was eliminated by

CAB. It will now be tried in a separate proceeding.

Military Charter Rate Change Pending

Most of the non-scheduled airline industry has withdrawn proposed military charter rate increases for C-46 aircraft which CAB suspended last October. The action has been taken subject to re-filing a new rate-hike proposal in the near future.

Initially the carriers proposed increases from 80c to 95c in "ferry" rates and from \$1.25 to \$1.35 in "live mileage" rates. The Defense Department, which uses the charter services to a great extent, protested to CAB, and the increases were suspended pending formal investigation.

Officials of the carriers explained their withdrawal of those increases as resulting from further studies which indicate a more pressing need for higher ferry charges and a slight increase in "live" rates. A revised proposal, being prepared for submission to CAB, would increase the ferry rate from 80c to "90c or 95c" and "live" rates from "two to five cents."

CAB CALENDAR

Feb. 3—Oral argument before the Board in Reopened North Central Route Investigation. Washington, D. C. (Docket 4603 et al.)

Feb. 5—Oral argument before the Board in Las Vegas-Los Angeles Restriction Case. Washington, D. C. (Docket 5219 et al.)

Feb. 12—Oral argument before the Board in Southern Airways Certificate Renewal Case. Washington, D. C. (Docket 5199 et al.)

Feb. 16—Hearing in Cleveland-New York Nonstop Case. Washington. (Docket 1789 et al.)

Feb. 18—Hearing in Braniff-United Denver Interchange Case. Washington, D. C. (Docket 5827).

Feb. 23—Hearing in Trans-Atlantic Cargo case (Seaboard & Western, et al.). Washington, D. C. (Docket 3041 et al.)

RECENT CAB DECISIONS

• **New York Airways**, certificated helicopter operator, denied exemption which would exclude carriage of certain cargo from tariff requirements of the Act.

• **Air Lines Pilots Association** granted request for appointment of an

Examiner to take evidence on identity of pilots with valid money claims against Western Air Lines in connection with Route 68 sale to United Air Lines.

• **Continental Charters, Inc.**, tariff rule barring claims for injury, etc. unless written notice is presented to the carrier within 30 days found unlawful.

AS OF NOW . . .

The **NEW YORK-BALBOA THROUGH SERVICE PROCEEDING** becomes the first major air case for a Republican administration to decide. Passed over by President Truman for over six months, the case involves new interchange services between New York and Latin America through the Miami gateway. Carriers chiefly involved are Pan American, Panagra, Braniff, Eastern, and National.

Like all international route cases, CAB's decision must get White House approval. Last summer the Board made its decision and forwarded the case to the President. Officially, it has remained untouched since. It is not improbable it will be untouched for months to come because of the enormous amount of work confronting President Eisenhower.

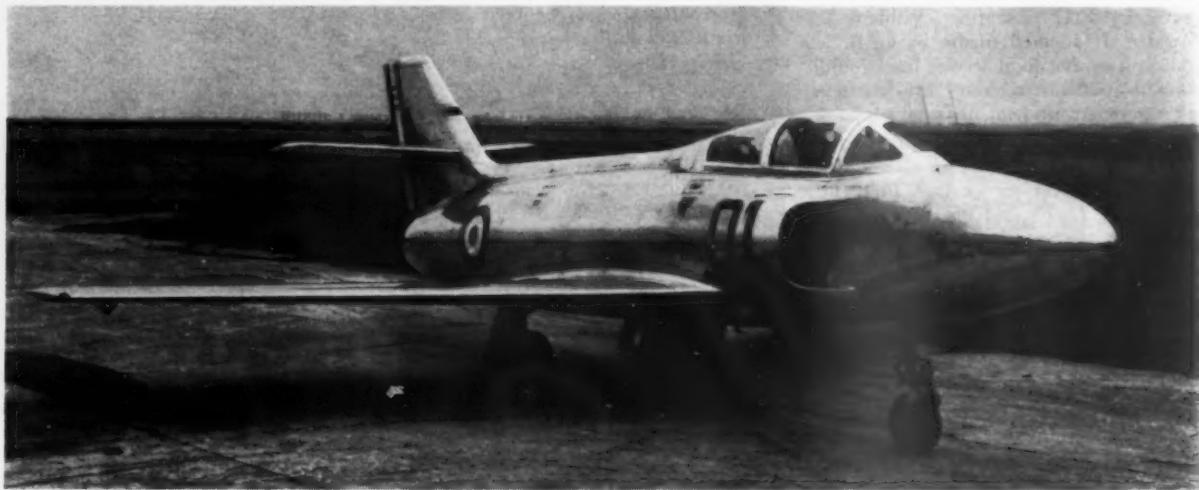
The Republicans will also have a crack at some other highly important international cases within the next year and a half. One, the **TRANS-ATLANTIC CARGO CASE**, on which hearings will begin this month, involves possible certification of all-cargo carriers between the U. S., Europe, and beyond.

Other cases in this realm include the **TRANS-PACIFIC CERTIFICATE RENEWAL CASE**, principally involving Pan American and Northwest; the **U. S.-HAWAII CASE**, involving United, Pan American, and Northwest; and the **U. S.-ALASKA CASE** involving Pan American, Northwest, and numerous others.

In addition, cases involving foreign lines operating to this country will come under the Republican wing for the first time. Principal among these is the **PHILIPPINE AIR LINES SAN FRANCISCO-MEXICO CITY PERMIT CASE** which, like other such cases, must get Presidential sanction.

Also, a new international case is brewing involving **SERVICE BETWEEN THE U. S. AND THE BAHAMAS**. The former Butlin's Village resort is being re-established by a new organization with fresh capital. National Airlines has applied to add West End, Grand Bahama, to its routes. Other carriers are expected to follow National's lead.

International Report



France's latest all-weather fighter is the Dassault MD 453 Mystere de Nuit. It differs from the day fighter Mystere series in having lateral air intakes, thereby leaving the nose free for the installation of radar and armament.

Air France May Fly Polar Route

Air France is interested in a trans-polar route connecting Paris with Tokyo, Henri A. Ziegler, general manager of the French national airline has told AMERICAN AVIATION's Paris editor in an exclusive interview. Meanwhile, signature of a bilateral air agreement between France and Japan, formally authorizing Air France's recently opened weekly schedule into Tokyo via the Middle East, India, and Saigon, is expected shortly.

Ziegler also disclosed that deliveries of Air France's Lockheed L-1049 Super Constellations are about four months behind schedule. First of the ten planes is now scheduled for August delivery. On-schedule (May-June) delivery is expected, however, of the three de Havilland Comet IA's which Air France plans to operate on the Paris-Middle East (Istanbul, Beirut, Cairo) routes and also on the Paris-Casablanca-Dakar run.

The first of 12 Vickers Viscounts on order is expected to be handed over to Air France in February, and will go into scheduled service in April. Six of the planes are to be delivered this year. The Viscounts are to be used for tourist operations on European services, starting with the Paris-Milan-Rome-Athens-Middle East route, and will also fly between London and Nice (but not on the London-Paris route, which is con-

sidered too short for the economical operation of the turboprop plane).

Twelve Breguet 763 Deux Ponts will be delivered to Air France in 1953 and 1954, Ziegler said. He added that delivery of these four-engine transports is behind schedule. The Breguets will be used on Air France's Western Mediterranean routes and may see service in French West Africa. Use of heavy equipment in this area is conditional on an improvement in airports which, in many cases, are suitable only for equipment of the Douglas DC-3 type or size.

Asked if Air France would start regular all-cargo operations on the North Atlantic, Ziegler replied that this had been planned for some time but had not been realized due to shortage of equipment. Deliveries of new planes during the year would allow more equipment to be switched to all-cargo operation.

Discussing the extension of tourist-class services to the European system in April of this year, Ziegler said that fares must be lowered still further and frequencies stepped up if operations comparable to U.S. coach services are to be achieved. European airlines are making progress in that direction by streamlining their handling procedures, Ziegler said. He stressed, however, that governments must also increase their

facilitation effort and rationalize operational methods on European routes to reduce airlines' operating costs.

All-Cargo Transports Stir Interest Abroad

Indicative of the interest in all-cargo transports throughout the world comes the news that SIAI-Maschetti, Italian manufacturer, has designed a model resembling the Fairchild C-119 and known as the SM 115. It would gross about 55,000 pounds and would cruise at slightly over 200 mph. Maximum payload would be 15,000 pounds in a version powered by two P&W R-2800's.

Meanwhile in France great hopes are being placed in the Nord 2501 (another model resembling the C-119) which is being produced in quantity for the French Air Force. One of these planes was due to start a demonstration tour of South America at the end of last month. Particular attention will be paid to the Brazilian market. If the tour is successful licensed production of the Nord 2501 in Brazil may be negotiated.

Finally in England Blackburn and General Aircraft Ltd. has announced that its four-engine Universal Freighters (Beverley is the name of the military version) will have an operating cost of seven cents per ton-mile and 1 1/4 cents per passenger-mile over a stage distance of 500 miles.

The Most Trusted Name in Ignition



**meets the
operating needs
of every plane**

No single type of ignition equipment is the final solution to every operating problem. That's why Bendix approaches each new assignment with an open mind. The particular type of ignition system recommended is decided on the basis of meeting individual requirements for economy, performance and dependability.

Of one thing you can be certain, from the broad Bendix experience and unrivaled facilities will come ideas and products tailored to your needs. For piston, jet, turbo-jet or rocket engines every component part of your ignition system will meet the uncompromising standards of quality established by Bendix over a quarter of a century ago.

This combination of facilities and skill is ready to go to work for you in the solution of any ignition problem from planning to finished product.

AVIATION PRODUCTS

Low and high tension ignition systems for piston, jet, turbo-jet and rocket engines . . . ignition analyzers . . . radio shielding harness and noise filters . . . switches . . . booster coils . . . electrical connectors.

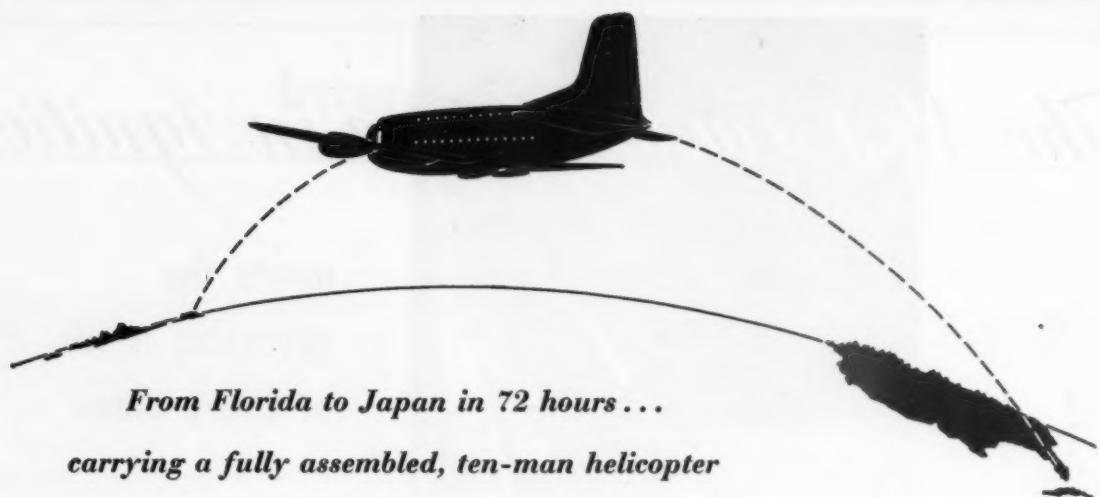
Bendix

SCINTILLA MAGNETO DIVISION
SIDNEY, NEW YORK



Export Sales: Bendix International Division
72 Fifth Avenue, New York 11, N. Y.

FACTORY BRANCH OFFICES: 117 E. Providence Avenue,
Burbank, California • Stephenson Building, 6560 Cass
Avenue, Detroit 2, Michigan • Brewster Building, 176
W. Wisconsin Avenue, Milwaukee, Wisconsin • 582 Market
Street, San Francisco 4, California



*From Florida to Japan in 72 hours . . .
carrying a fully assembled, ten-man helicopter*

-the DOUGLAS C-124 Globemaster

From the front lines in Korea last year came calls for a 10-man helicopter. The Air Force had some, but they were in Florida—9,000 miles away.

Normal air transport could make the flight in time, but tearing down a helicopter—reassembling it in Korea—would

waste a week. So the Air Force turned to a Douglas C-124 Globemaster, the flying giant that covers thousands of miles nonstop with a 25-ton payload. Globemaster opened its clam-shell doors and swallowed the helicopter whole, took off, and reached Japan in 72 hours.

Next day, at the Korean front, our men had the helicopter they needed.

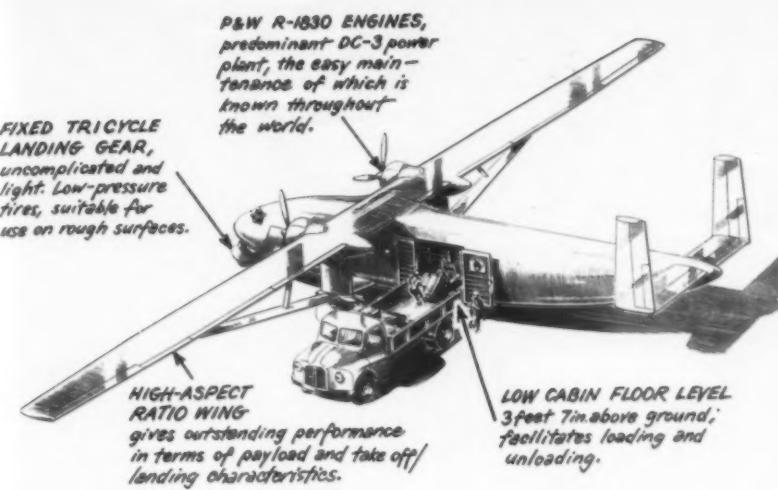
Performance of the Globemaster in action is another example of Douglas leadership in aviation. *Faster and farther with a greater payload* is a basic of all Douglas design.



Depend on DOUGLAS



First in Aviation



HD32: Best of the DC-3 Replacements

Common sense approach, absence of frills, mark new plane, prototype of which is to fly any day now.

A FEATURE of the postwar aviation scene has been the regular appearance of new transport aircraft designs bearing the label "DC-3 replacement." Many of these designs have remained blueprints, others have moved into the prototype stage but have advanced no further, and a few have gone into production.

Although various major airlines and a few smaller ones have in fact used some of these planes to replace DC-3's, the great majority of operators have found the new designs to be too costly, too complicated, or too large to merit serious consideration. Moreover, several of the postwar designs are incapable of using small fields suitable for DC-3's.

The most realistic approach to the small operators' requirements for a "DC-3 replacement" has come from a component of the much-criticized French aircraft industry—Societe des Avions Hurel Dubois—in the form of a model designated the HD 32 (the prototype of this design, the HD 31, should be flying by the time these words appear in print). Sensible is perhaps the most appropriate adjective for the HD 32—the design incorporates a lot of common sense, whereas a lot of frills have been "included out."

The use of an unusually high-aspect-ratio (20.2) wing gives the HD 32 an outstanding combination of payload performance and take-off/landing characteristics. For instance, at a gross of 36,382 pounds—with a payload of 10,235 pounds—take-off and landing runs for the passenger version are only 1,476 feet and 1,148 feet, respectively.

Most sensational of all, the wing

arrangement enables the single-engine take-off run to be exactly the same as that on two engines. Operating costs, as may be seen from the table, are amazingly low. The only feature of this aircraft that is not outstanding is its speed—maximum, 187 mph, and recommended cruising at sea level, 155 mph.

Designed for short range operations (although it can fly stages of up to 1,243 miles), a slight sacrifice in speed is unimportant when considered alongside the numerous advantages of the HD 32. Here are some detailed range and payload figures:

Pounds for:	Stage (miles)			
	310	621	932	1,243
Fuel and oil	2,646	3,969	5,292	6,615
Payload—				
Passenger	10,235	8,930	7,607	6,284
Cargo	12,789	11,486	10,143	8,820

To round off this description of the HD 32, the following general data should be mentioned: span, 148 feet; length, 72 feet; height, 22 feet, 7 inches; wing area, 1,076 square feet; stabilizer area, 172 square feet; fin area, 140 square feet; cabin width, 7 feet, 3 inches; cabin height, 6 feet, 6 inches; height of floor above ground, 3 feet, 7 inches; size of cabin door opening (freight version) 78 inches x 78 inches; weight-bearing capacity of floor, 144 pounds/square foot.

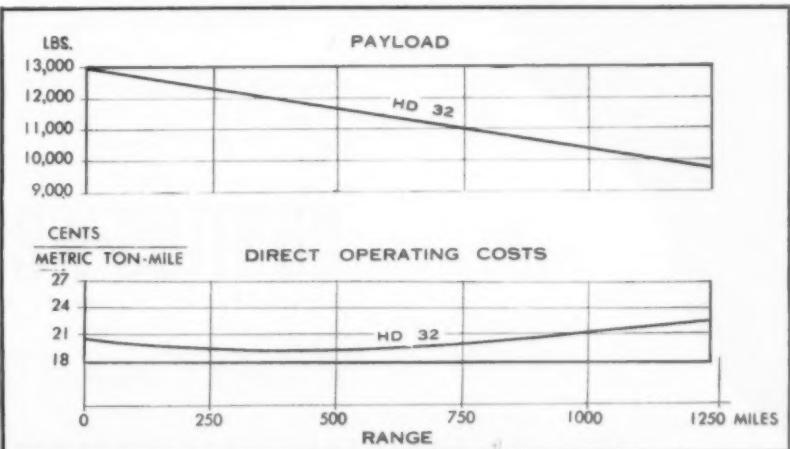
Thus it will be seen that this is a big aircraft—big in everything except operating cost and airfield requirements. Initial cost data has not yet been announced by the manufacturer, but due to the simple construction, low manpower costs in France, and lack of frills, the tag should be well below the figure of \$300,000 seemingly regarded as today's minimum for "DC-3 replacements." If flight performance comes up to design standards, the HD 32 should be rated a "best buy" by the DC-3 consumers' union.

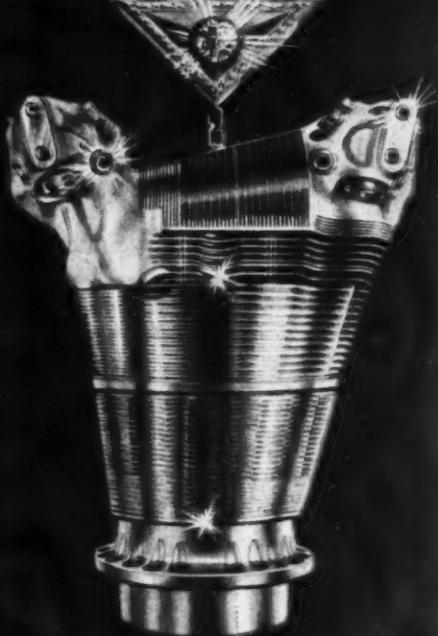
INTERNATIONAL BRIEFS

The Arab countries of the Middle East are expected to take advantage of a British government offer to allow each Middle East nation to buy up 13 Gloster Meteor 8 fighters and a number of Meteor 7 trainers. All of the Arab states have predominantly British combat aircraft equipment.

Aigle Azur, French independent airline, has ordered two Canadian de Havilland Beaver single-engine transports and has applied to the French government for authorization to order two Douglas DC-6B's in 1954 and a third in 1955. The company at present operates five Boeing 307 Stratoliners on long-distance routes and 20 medium and light transports in Indo-China.

Economics of the HD32





Sterling performance—Cyclone Cylinders in the
Constellations of Eastern Air Lines' "Great Silver Fleet"
and KLM's "Flying Dutchmen" produce
139 H.P. each...7,000 to 10,000-hour life...
approximately 2,750,000 miles of service per cylinder.

CURTISS-WRIGHT
CORPORATION • WOOD-RIDGE, N.J.

World's Finest Aircraft Engines

JOBs FOR ENGINEERS • ACCOUNTANTS • TECHNICIANS

Production Spotlight

Parts Interchangeable On B-47, Tests Show

First of a series of tests to determine whether the parts of the B-47 Stratojet medium bomber being built by Boeing-Wichita, Douglas-Tulsa, and Lockheed-Marietta are interchangeable has proved successful.

In the first test, stabilizer and fin assemblies built by the Crosley Division, Avco Manufacturing Co., for Lockheed and Douglas were compared with similar components Cessna Aircraft Co. is producing for Boeing. It was determined that these parts could be switched from one Stratojet to another without rework or alteration.

The B-47 Production Committee, comprised of representatives of the three companies building the airplane, supervised the testing through a subordinate interchangeability team. This team eventually will have to cross-check almost all B-47 parts to make certain that assemblies used at all three plants are identical.



Like a railroad, tractor movements of T-33 fuselages trundle through Lockheed's Burbank plant. Tractor does a moving job in three minutes that formerly took four men an hour. In picture above, assembly line at left has been moved forward, but new jig is not yet in position.



Aeroproducts Props for New Flying Boxcar

A new model of the Fairchild twin-engine Flying Boxcar series is ready to go into production at Hagerstown, Md. The C-119G, like its predecessor, the C-119F, will be powered by two Wright R-3350-30W Turbo-Compound engines.

Principle difference will be in the propeller. The F used Hamilton Standard 2-J-17 props but the latest model will be equipped with four-bladed Aeroproducts A644FN-C1 (F-40-A) propellers. Some tests on the new engine-prop combination have been completed.

Supplies Seen Adequate For Civil Production

The CAA Office of Aviation Defense Requirements, which monitors supplies of controlled materials for commercial transports, non-carrier aircraft, and airports, believes the supply of steel, copper, and aluminum is adequate to take care of presently scheduled production, as well as for maintenance, repair, and operation of existing planes.

G. R. Gaillard, director of OADR, says amounts of CMP materials allotted to NPA's Aircraft, Ordnance and Shipbuilding through the second quarter of 1953 will "wholly or substantially" take care of all requirements for non-military planes, including transports being built for both foreign and domestic airlines.

WAGE BRIEFS

New labor contracts and contract approvals by the Wage and Salary Stabilization Boards made news last week:

- **Bell Aircraft Corp.** plants at Buffalo and Fort Worth gave UAW-CIO workers a $7\frac{1}{2}\%$ increase, boosted Grade One employees a nickel, and made half of the current 14¢ cost-of-living payment a permanent part of base pay.

- **Rohr Aircraft Corp.** agreed to a seven cent boost for its IAM-AFL workers and a five per cent boost for salaried and office personnel. A five cent raise was given to those in Grade One and three cents for those in Grade Two.

- **Douglas Aircraft Co.** plants at El Segundo and Santa Monica (IAM) and Long Beach (UAW) were given permission to give 46,401 employees five cents more an hour.

- **Consolidated Vultee Aircraft Corp.** was authorized to pay its 16,568 San Diego hourly workers (IAM) seven cents more and its 2,000 salaried workers six per cent additional.

Letters

AIR FORCE SAFETY

To The Editor:

Your lead editorial on A.F. safety in the January 19 issue was most interesting, since the writer was assigned to the office of Flying Safety, H.Q., A.A.F., during the recent rassle.

An outsider's observation on the present situation might be of interest. Since most problems eventually boil down to personnel, might not it be in order for the Air Force to consider assignment to its Air Transport Service as practically permanent, as is the case I understand of the Construction Corps in the Navy. In other words, make a complete separation between combat and transport operation. If this were done wouldn't airline-type operation of transport, with entirely different rules and criteria for promotion, etc., be much easier to establish and enforce—with resultantly greater efficiency?

Also, a real inducement to many younger men to enter the transport service would probably be its eventual emergence as operators of the only Air Force personnel-carrying aircraft.

GEORGE C. PRICE

President
Electrical Mfg. Company
Battle Creek, Mich.

(In our opinion, yes.—Ed.)

DRIVE AND ATTENTION

To The Editor:

In view of the kind of position I hold, the information on approved over-haul times as shown in your Oct. 27 Accessory & Equipment issue is especially useful and will certainly be seen by all concerned in my department. I'm just another who appreciates the drive and attention your organization applies to its job and I wish you continued success.

J. J. DAVIES

Chief Maintenance Engineer
Trans-Australia Airlines
Melbourne, Australia

To The Editor:

The first annual accessories and equipment issue which you published Oct. 27 is a most useful and informative issue which will be put to good purpose here.

R. J. RITCHIE

Controller Technical Development
Qantas Empire Airways Ltd.
Sydney, Australia

Advertisers Index

Aerocom	40, 41	Flightex Fabrics, Inc.	60
Airesearch Manufacturing Company	43	B. F. Goodrich Company	8
Allison Division, General Motors Corporation	18	General Electric	51
Beech Aircraft Corporation	56	Goodyear Tire & Rubber Company, Inc., The	3
Bendix Aviation Corporation Bendix Eclipse-Pioneer Division	Third Cover	Kollsman Instrument Corporation	28
Bendix Scintilla Magneto Division	26, 69	Hotel Lexington	64
Braniff International Airways, Inc.	77	Maryland Electronic Mfg. Co.	35
Breeze Corporation, Inc.	55	Minneapolis-Honeywell Regulator Company	Second Cover
Chance Vought Aircraft Division, United Aircraft Corporation	22, 23	Phillips Petroleum Company	Back Cover
Chase Aircraft Company	58	Pratt & Whitney Division, United Aircraft Corporation	61
Chicago & Southern Air Lines, Inc.	59	Scandinavian Airlines System	60
Collins Radio Company	78	Simmonds Aerocessories, Inc.	65
Curtiss-Wright Corporation	72	Sinclair Refining Company	30, 31
de Havilland Aircraft of Great Britain	7	S. C. Aeronautics Commission	64
Delta Air Lines, Inc.	59	Southwest Airmotive Company	45
Douglas Aircraft Company, Inc.	70	Sperry Gyroscope Company	44
Fairchild Engine & Airplane Corporation		Thermix Corporation	53
Fairchild Engine Division	33	United Air Lines	63
		Vickers, Incorporated	20
		Wilcox Electric Company, Inc.	5

AIRLINE SEATS

for DC3—DC4—DC6,
and Lockheed Constellation

Warren McArthurs, Hardman,
Douglas and Payloads. LO and
HI Density—Singles, doubles,
triples. Delivery from stock.

TRANSPORT AIRCRAFT—ENGINES

AIRLINE EQUIPMENT CORP.
Newark Airport, Newark, N.J.
MARKET 2-0963-4



IMPROVED HANGAR
198' WIDE BY ANY LENGTH
WE WILL ERECT ANYWHERE

GEORGE D. WIDMAN, Inc.
17823 Evelyn Ave.
Gardena, California
MEnlo 4-3127 - Plymouth 4-2949

SALES REPRESENTATIVE

Representing a sales, service and manufacturing organization covering a territory of Eastern United States. Position requires a man experienced in soliciting contract business from larger aircraft manufacturers, etc. Flying background and pilot's license essential. Personal plane provided. Salary and commission. Please submit complete education and employment abstract. All replies will be treated confidentially.

Reading Aviation Service, Inc.
Municipal Airport
P. O. Box 1201
Reading, Pennsylvania

SENTINEL

Says:

"INSIST on the BEST
in QUALITY and SERVICE"

BOSCH and SCINTILLA
magneto components

N-R-C BEARING
distributors

SENTINEL AVIATION CORP.
512 North Pitt St.
Alexandria, Virginia

**Make this space work
for you . . .**

THE BULLETIN BOARD

Undisplayed Advertising: \$1.00 per line, minimum charge \$4.00. Cash with order. Estimate 30 capital letters and spaces per line; 40 small lower-case letters and spaces per line. Add two lines if Box Number is included in lieu of advertiser's name and address.

Displayed Advertising: \$10.00 per inch for less than 15 inches in one issue or in any 12-month period. For more than 15 inches, \$6.50 per inch; more than 30 inches, \$6.00; more than 60 inches, \$7.50; more than 90 inches, \$7.00; more than 120 inches, \$6.50. Space units up to full pages accepted in this section for classified-type advertising

Forms close 20 days preceding publication date. Address all correspondence to Classified Advertising Department, AMERICAN AVIATION PUBLICATIONS, 1025 Vermont Ave., N. W., Washington 5, D. C.

AIRLINE PILOT: 9,000 hours. A. T. R. DC-3 desires position as executive pilot or with foreign airline. Two years college; two years Air Corps flight instructor, nine years as airline pilot, many years experience in South America, bilingual, passport, age 32, married. Immediately available, all offers considered. Write Box 797, AMERICAN AVIATION Magazine, 1025 Vermont Ave., N. W., Washington 5, D. C.

Government certified specialists in hard chrome plating and grinding to specifications silver, lead, indium, tin, copper and modifications of Pratt Whitney Aircraft engine parts, tin and tin lead on Wright Aircraft engine parts. CREWS ELECTRO PLATING COMPANY, 252 N. W. 29th Street, Miami, Florida.

Wanted: Experienced Radio Man to head Radio Department for large modification shop. Must have thorough knowledge of Collins and Bendix radio equipment, also Automatic Pilot installations. This is a well paid, permanent position for the right man. Box 798, AMERICAN AVIATION Magazine, 1025 Vermont Ave., N. W., Washington 5, D. C.

Wings Field WINGS, INC. Phila. Int'l. Airport

Aircraft Sales & Service Since 1929

Consult Us with Confidence before BUYING or SELLING any type aircraft
You Pay Nothing for Our
EXPERIENCE and INTEGRITY
AMBLER 1800

BOOKS FOUND! Free world-wide search service. Aviation history and literature a specialty. Fast service—reasonable prices. Send wants—no obligation. International Bookfinders, Box 3003-AA, Beverly Hills, Calif.

EXECUTIVE FLIGHT CREW AVAILABLE

AIRLINE CREW presently employed, desires permanent executive aircraft position, domestic or foreign. Superior flying ability, responsibility, and general appearance. Technical and personal references on request.

CAPTAIN: 12,000 accident-free hours, ATR in most 2 and 4 engine aircraft, land and water. Presently flying Captain with scheduled airline.

1st OFFICER: 6,000 accident-free hours, ATR in most 2 and 4 engine aircraft. Presently flying Captain with scheduled airline.

HOSTESS: Airline experienced, wife of Captain, available as required.

ENGINEER: properly certificated, also available if required.

Box 796, AMERICAN AVIATION Magazine
1025 Vermont Avenue, N. W. Washington 5, D. C.

YOUR MOST VALUABLE ASSET IS "EARNED INCOME"—PROTECT IT!

There were 9 million Americans accidentally killed or injured in 1951—(of these, automobiles alone accounted for 37,500 killed)—a few pennies in a machine will not insure the major risks of loss—for example, flying as a passenger is so small a risk that Lloyd's Global Accident Insurance contracts include it at no extra cost.

Underwriters at Lloyd's, London

HAVE AUTHORIZED

G. SHANNON GROVER & COMPANY

Room 2112 141 W. JACKSON BOULEVARD, CHICAGO 4, ILLINOIS

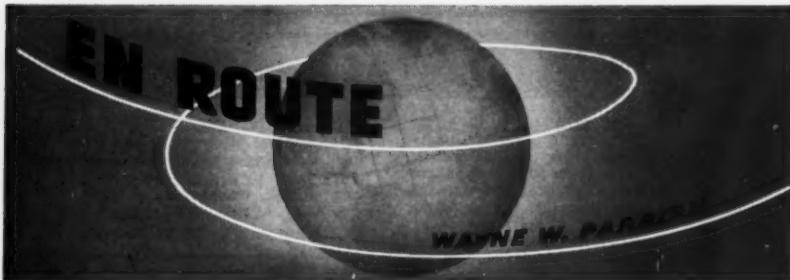
to issue on their behalf, to business men and women, Global contracts giving complete accident coverage throughout the world.

Write today on your business letterhead for full information. Address your letter to G. Shannon Grover & Company—Room 2112, 141 W. Jackson Boulevard, Chicago 4, Illinois.

High Limits

Either Group or Personal

LAND—SEA—AIR—HOME OR AWAY
CONSTANT PROTECTION—NIGHT AND DAY



Saul of Tarsus. Saul of Tarsus was a tentmaker, the son of a Jewish father who was a Roman citizen. He was born in Cilicia and came of age in the early part of the first century in Jerusalem at the time when Jesus Christ was preaching from town to town and Christianity was taking root throughout the Middle East in the face of vigorous persecution.

Most of what we know about Saul comes from the Bible. It seems that he both assisted and applauded during the riot in which St. Stephen, the first Christian martyr, was stoned to death. So impressed were his Roman superiors at his activity during this bloodshed that Saul was soon asked to go to Damascus to undertake the suppression of Christianity there. That was A.D. 35.

As Saul approached Damascus something occurred to change his life. He saw the glorified Jesus Christ and heard Him ask, "Why persecutes thou me?" Saul was temporarily blinded and was led into the city. He joined the Christians and became an Apostle to the Gentiles and one of the greatest of the Christian missionaries.

By Guard to Rome. He was now Paul, later to become St. Paul, and he preached not only in the Middle East but as far away as Cyprus and Greece. But in the year 59, during what proved to be his last visit to Jerusalem, he was arrested by the Romans for provoking a riot. After two years in jails and hearings before the council and Felix and Agrippa and Festus, he finally appealed to Rome on his citizen's rights.

So Paul was sent to Rome under guard and on the way the party was shipwrecked on a tiny rocky islet a few hundred feet off the main island of Malta, sixty miles south of Sicily. Malta is the island of Melita in the Bible. Paul managed to continue his preachings for a while in Malta before getting underway again for Rome.

There he was acquitted and resumed his travels. But some years later, about A.D. 67, Paul was beheaded by Nero at a spot on the Ostian Way two miles south of the city of Rome. His tomb and shrine are to be seen today at the Roman basilica of St. Paul's-Outside-the-Walls, one of Rome's beautiful churches.

When you visit Malta today and drive about twelve miles west of the capital city of Valetta along the north shore you see the island on which Paul was shipwrecked 1900 years ago. A large cross stands on the rocks today to mark the spot. The shipwreck of St. Paul less than two thousand years ago is but one of a great many events which make Malta one of the most historic places on the globe as we know it today.

Knights of Malta. Almost a thousand years after St. Paul's brief visit, the number of pilgrims journeying from the west to the Holy Land at the eastern end of the Mediterranean had increased so greatly that some Italian merchants obtained permission to hold Latin-rite services in Jerusalem for the travelers. Later a hospital was set up for the ill and infirm.

When the Crusaders took Jerusalem, the work of the hospital expanded and the master of the hospital, one Gerard de Martignes, created a separate order, the Friars of the Hospital of St. John of Jerusalem, which was recognized by the Pope in 1113.

The original object of the order was to aid pilgrims, but it became apparent that military protection was also required. In due course the order was reconstituted as a military one and members undertook to bear arms in support of the Latin Kingdom of Jerusalem and of the Crusaders.

The knights of this order took part in the Crusades in the 12th Century and for many years they fought the Moslems in the entire Middle East and helped convoy pilgrims to the Holy Land. In the 14th Century they made their headquarters on the island of Rhodes after driving out the Saracens.

In 1522 the Turks drove the Knights out of Rhodes and eight years later, in 1530, Charles V, King of Spain and Emperor of most of Europe, gave them the island of Malta. From then on they were known as the Knights of Malta and the order remained there until Napoleon captured the island in 1798.

Maltese Cross. The symbol of the order was a white cross on a black robe, but it is not the Roman cross, but the Maltese Cross. Today when you visit Malta you will find a great deal remaining of the great days of the Knights of Malta. You will walk down the aisles and through the chapels of the beautiful old church in Valetta and on almost every square foot of tiling you will be walking over the tomb of a noble Knight. It is one of the most impressive memorials you will find anywhere. The city of Valetta was plastered by German bombs during World War II. The church was one of the very few buildings to escape damage. All but one small chapel, that is. One German bomb hit one chapel—and it was the only German chapel in the church.

After Napoleon took Malta, the Knights of Malta chose Czar Paul, of

Russia, as grand master and many of the members went to St. Petersburg, now Leningrad, and the Pope gave permission for this Catholic order to go under the rule of an Orthodox Emperor. Upon Czar Paul's death the Knights moved to Sicily and eventually to Rome. Various offshoots and reorganizations have taken place, along charitable lines, but these have had little relation to the original order, which pretty much came to an end about 1805.

I have told you all of this because you become sharply aware of history when you visit Malta. It was curiosity which took me there a few months ago with Clive Adams, sales manager of British European Airways. We flew on BEA from London to Valetta and spent three delightful days with Roger Strickland, the personable owner and operator of the Phoenixia Hotel, a strictly first class hostelry with a strictly first class cuisine.

Two Sieges. Roger got some people together for an all-day picnic and swim on the western side of the 20-mile-long island, not very far, in fact, from the island on which St. Paul was wrecked. It was, by chance, an extremely festive day in Malta, being the anniversary of two vital days in the island's history: the lifting of the siege by the Turks in 1565, and the lifting of the siege of World War II. Every village on the island celebrated by shooting off small fortunes in fireworks that night.

It was a great celebration, and well it might be. I can't imagine what the Turks would have done had they taken the island in 1565, but I do remember reading about the very critical time which Malta had in undergoing the terrific bombardment by the Germans.

Malta narrowly escaped "going under," but it held out because of the determination of its people. Damage to Malta was very great, food was extremely scarce, and at one brief point there wasn't a single serviceable fighter plane left. But Malta survived, and for this in 1942 the people were awarded the George Cross for their valor and hardships. This was the highest civilian award for bravery.

As you know, Malta is a British Crown Colony and has been in British hands since 1800, two years after Napoleon had grabbed it. It is severely over-populated, having now an estimated 320,000 people for a mere 95 square miles of rocky, barren land. It cannot conceivably be self-sufficient with so many people to care for. But it is a vital British naval base and these days you'll see some USAF or U. S. Navy airplanes on the field.

Rocky and Barren. Just south of Italy, Malta looks more like the Middle East than like Europe. It is almost barren of trees. The houses are of stone and the roads are lined with stone walls. It is not a resort but the swimming is good if you have transportation to the beaches on the west end. It reeks with history and age, and there are caves to be seen in which prehistoric man lived many thousands of years before Christ.

Few spots in the world have played such an historic role as this tiny island. You dip deeply into the past when you fly into Malta.

in
**south
america**

*Braniff
does make
the difference!*

Quiz R. W. "Bert" Hemphill. He'll tell you. In fact, his slogan's "ask the man who's been there." Bert's still up-in-the-clouds about his recent Latin American flight with us. And we're happy as larks (skylarks, that is) when such experts get flowery about our trips and our treatment. How expert is this gentleman from California? He's circled the globe 10 times, "done" South America 11 times—flown 500,000 miles since 1945!

We hear his Hemphill World Cruises have practically given the West Coast wanderlust. His most sophisticated clients are raving and asking for more. Well, Bert's going to give it to them with a new series of South American tours—via Braniff, of course. It's a clear case of flattery getting them somewhere—somewhere wonderful. To Bert and his travelers, we say "welcome aboard."



it's BRANIFF

INTERNATIONAL AIRWAYS

Love Field

• Dallas, Texas



Inspired by backdrop of Rio's famed Sugar Loaf, "Bert" Hemphill of Hemphill World Cruises and Charlie South, Braniff's Manager for Brazil, plan a new series of South American tours.



News at Deadline

Grace, Hackney Head New Airfreight Group

A new air freight association, Transport Air Group, will open Washington headquarters in early February to represent its membership as a unified spokesman.

The new group, which represents a reactivation of the old Air Freight Association, will be headed by Thomas L. Grace, president of Slick Airways. L. R. (Mike) Hackney, cargo specialist with Lockheed Aircraft Corp., will be executive vice president and will be responsible for direction and administration of TAG's activities from the Washington office.

TAG's objectives are (1) to promote recognition of the independent air carrier as an instrument vital to the nation's security in an emergency and to the welfare and economy of industry and commerce in peacetime, (2) to exchange technical and economic information, (3) to encourage development of suitable aircraft and equipment as well as efficient operating standards and effective regulations, (4) to promote better understanding of benefits to military and civil agencies of flexibility in providing domestic and international charter and all-freight services, and (5) to offer air transport industry, government and military a single focal point of contact regarding such services.

Attending organization meetings were California Eastern Airways, Flying Tiger Line, Overseas National Airways, Seaboard & Western, Slick and Transocean Air Lines. Following presidents were tentatively chosen to serve as TAG directors: Grace; O. M. Nelson, Transocean; R. W. Prescott, Tigers; S. J. Solomon, Cal Eastern, and G. W. Tompkins. Overseas National.

NY-Balboa Decision Tossed Back To CAB

The CAB decision in a case involving various interchange possibilities between the U. S. and Latin America, which had been at the White House about six months, was returned to the Board for further review by former President Truman before he left office, it was learned last week.

The returned decision in the case (New York-Balboa Through Service Proceeding) reportedly supported an

Eastern-Braniff interchange, and another one involving National, Panagra and Pan American. The case had included a voluntary agreement between PAA and EAL for such a through service.

There was no available evidence that Truman had rejected CAB's findings. Some sources said the action could have been routine, with Truman returning unfinished business for re-submission to the new Administration. Once before, the same decision was returned to CAB, but not by Truman. It had not passed the White House staff level.

Original CAB decision, submitted last summer, was 5-0 in favor of EAL-Braniff and PAA-Panagra-NAL. Another phase of the decision was 4-1 in favor of denial of the EAL-PAA interchange agreement.

Though returned by the White House some months ago, it was learned, CAB, upon reconsideration, re-submitted the same decision for Truman's signature. Under pressure from all sides, Truman, in the waning days of the Democratic administration, refused to get involved and would not sign the CAB decision.

Engine Trouble Grounds BOAC's Stratocruisers

Temporary grounding of its 10 Boeing Stratocruisers as a precautionary measure due to a recently-discovered engine defect was announced Jan. 22 by British Overseas Airways Corporation.

Grounding order, it was said, was issued after about 13 instances of "seizing" and overheating of the planes' Pratt & Whitney R-4360 engines during pre-flight tests. Trouble has been almost exclusively at the British end of the BOAC system. The engines are overhauled by the airline at Treforest, Wales. Only recent BOAC R-4360 modification involved installation of a new oil tank system.

Planes are used by BOAC on routes to New York and Montreal and from New York to the Caribbean. Grounding came at the height of the Caribbean season, when the BOAC Boeings offer over 500 seats weekly to Nassau and Jamaica.

Pan American World Airways and Northwest Airlines reported that their Stratocruiser engines were performing normally.

Martin Pays RFC Debt; Other Financial News

The Glenn L. Martin Co. has paid off all its RFC loans and has increased its line of credit with a group of banks headed by Mellon National Bank and Trust Co., thus consolidating its funded debt in one agreement.

The RFC debt which was paid off totaled \$3,172,575, and Martin also cancelled planned use of a \$12 million RFC revolving credit authorized a year ago, at the height of the company's financial troubles. Martin will also retire the balance of \$6 million in 10-year 4% convertible notes on February 25, over \$4.3 million having been retired last July through the sale of 727,203 shares of capital stock.

Martin's 1952 sales topped \$140 million and backlog was \$650 million, compared with \$68 million and \$402 million, respectively, in 1951.

Other financial news:

A net of \$8.97 a share was earned by Douglas Aircraft Co. on sales of \$552,480,000 for the fiscal year ended last Nov. 30, compared with a \$5.76 net on \$225,173,000 sales in the 1951 fiscal period, according to a preliminary financial report.

The \$8.97 net included a \$1.06-a-share profit resulting from two year-end adjustments: a re-apportionment of tooling expenditures, and "restoration to income of a reserve for which it appeared there was no further use."

McDonnell Aircraft Corp. had first-half net to Dec. 31 of \$1,831,620 on sales of \$58,332,531, against \$1,407,775 net on \$34,325,859 in same 1951 period. Backlog is at all-time high of \$460,055,266.

Curtiss-Wright Corp. and subsidiaries had 1952 consolidated net sales of \$325 million, against 1951's \$176,625,380. Sales in last quarter of 1952 were \$110 million, about double those of the same 1951 period.

Aeroquip Corp. reported first-quarter net to Dec. 31 of \$260,885 on \$5,431,621 sales, compared with \$246,084 on \$5,162,562 sales in same quarter last year.

TWA's 1952 gross business hit record high of \$160-\$165 million (12% above 1951), but net profits won't reflect the increased gross, according to Ralph Damon, president.

Talbott Confirmation Still in Doubt

Confirmation of Harold E. Talbott as Secretary of the Air Force remained in doubt as this issue went to press. The Senate confirmed Charles E. Wilson as Secretary of Defense by a vote of 77-6 only after he agreed to dispose of \$2.5 million of stock in General Motors. Talbott agreed to sell stock in one company, Standard Packaging, but refused to dispose of 8,000 shares of Electric Auto-Lite with an estimated value of \$500,000, and of 2,000 shares of Chrysler with an estimated value of \$186,000.

Pending informal acceptance of the Defense Secretary's three service aides by the Senate, President Eisenhower has refrained from formally submitting their nominations. The other two aides are R. T. B. Stevens, Secretary of the Army-designate, and Robert B. Anderson as Secretary of the Navy-designate.

Four Sikorsky S-55's For New York Airways

New York Airways will use part of the proceeds from a new stock issue (100,000 shares at \$12.50 each) to pay for four Sikorsky S-55 helicopters plus spares. Ships, at \$150,000 each, are slated for delivery in June, July, September and October. Spares will cost \$100,000. Remaining money from stock sale will be used for general corporate purposes.

Handley Page Designs New Local Service Plane

A four-engined pressurized high-wing aircraft for use as a "DC-3 replacement" has been designed by Handley Page Ltd., of England.

Based on the Handley Page/Miles Marathon, the plane will be powered by four 870-hp Alvis Leonides Majors, have 220-mph cruising speed, 33,500 lbs. gross, maximum payload of 10,734 lbs. for 380-mile range or 7,050 lbs. for 1,500 miles.

With 36 passengers on a 1,500-mile flight, operating cost would be about 2¢ per seat-mile or 16¢ per ton-mile, company says. Design is known as the R3.

Unofficial "First Flight" For Convair XF2Y-1

The XF2Y-1 Sea Dart, Consolidated Vultee's Navy flying boat jet fighter, has made an "unofficial" first flight, rising about 10 ft. off the water during high-speed taxi tests.

Fairchild Strike Issues: Wage Boosts, Union Shop

Strike of 1,200 production workers at Fairchild Engine Division in Farmingdale and Valley Stream, L. I., was still on as this issue went to press, with federal mediators trying to renew contract talks on wage boosts and the union shop. About 800 engineering, office and supervisory employees went through CIO-Autoworkers' picket lines without incident.

Profits, Not Headlines Douglas Jet Aim

Asserting that he is not "unduly excited or worried by the jet problem," Donald W. Douglas, president of Douglas Aircraft Co., has stated that his company "is making most satisfactory progress in this field."

He told the Los Angeles Chamber of Commerce that "when we—and again I speak only for Douglas—are ready to deliver jet transports, they will be able to make money as well as headlines. Our airline operators prefer a few lines of small type in the income columns of the financial page to just big type on the front page.

"When our new jet-liners zoom into the skies—and that should not be too far away—they will fly at speeds of more than 560 mph, carry in excess of 60 passengers and be capable of crossing the U.S. in four hours, or of flying across any ocean or continent non-stop."

CAB Rejects United Air Coach Appeal

CAB turned down United Air Lines' appeal of the Board staff decision which refused short-notice filing permission to effect a reduction in UAL coach seats from 66 to 58 per plane. CAB has yet to rule on UAL's 30-day tariff filing proposing the same changes as of Feb. 12, and UAL's petition for reconsideration of the Board's Jan. 6 order which held the airline to be in violation of provisions of the Civil Aeronautics Act.

Airport Need In N. Y.: \$200 Million

Expenditure of at least \$200 million in the next 10 years must be made on airports to assure adequate handling of domestic and international air traffic in the New York metropolitan area, according to Howard S. Cullman, chairman of the Port of New York Authority.

He said the agency's 1953 budget of capital expenditures includes \$20,-

681,400 for additions and improvements to New York International Airport, \$8,006,000 for Newark Airport, \$1,384,200 for Teterboro, and \$136,100 for LaGuardia. At the end of 1952, PNYA had \$90 million invested in the four fields, and additional investments totaling \$120,919,000 had been made in the three major airports by the City of New York, City of Newark, and the federal government.

The 1952 traffic to and from the metropolitan area broke all records, Cullman said, and actually reached a level which had been anticipated for 1960. The four fields handled 516,393 plane movements, 6,537,267 passengers, 218,422,596 lbs. of cargo, and 55,732,711 lbs. of mail.

\$2.6 Million Suit Filed Against American

A \$2,685,000 damage suit has been filed against American Airlines by Mrs. Margaret W. Patterson, widow of former Secretary of War Robert P. Patterson, who was killed in an AA accident at Elizabeth, N. J., last January. Federal court attaches said it was one of the largest damage suits appearing in their records.

The suit charges AA with negligence and carelessness, and in assessing damages it pointed out that Patterson had gained international prominence as a lawyer, soldier, jurist, statesman and author.

Ann Archibald Dies

Mrs. Ann M. Archibald, 56, assistant vice president of Pan American World Airways, died on January 17 at Georgetown University Hospital, Washington, following a heart attack. She was interred on January 19 at Arlington Cemetery.

ARAMCO Buys DC-6B's

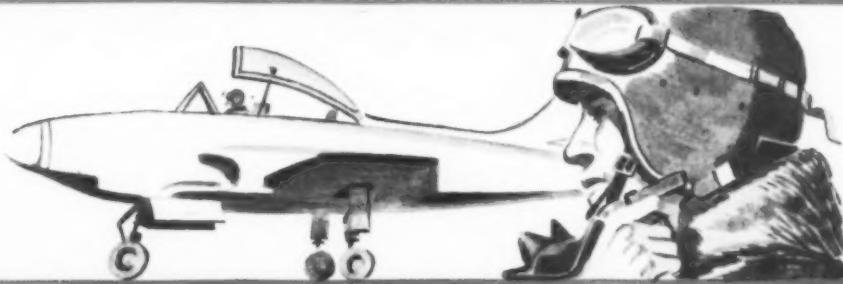
The only company other than a scheduled airline to operate DC-6B's is now the Arabian American Oil Company, recent purchaser of two of the aircraft, which it will use in eight round trips each month between New York and Dharhan, Saudi Arabia.

Hawker F2 Super-Sonic

The British Hawker Hunter F2 fighter, powered by an Armstrong-Siddeley Sapphire, flew at super-sonic speed in mid-January.

first in our planning...

THE MAN IN THE COCKPIT!



Since Korea multiplied an already heavy demand on our services, we at Eclipse-Pioneer have gone all-out to meet the new challenge. Besides greatly enlarging our own facilities, we've created a network of 23 complete unit sub-contractors and over 2300 first tier parts sub-contractors to help us deliver the goods. As a result, Eclipse-Pioneer production now stands at a record 514% of its pre-Korea level. But in all the acceleration of our plans . . . in all the haste to catch up with demand . . . we've never lost sight of one all-important fact. Our *first* responsibility is to the man on the spot—the man whose efficiency and, indeed, whose life depend so largely on the precision operation of our instruments and accessories. Because we cannot compromise quality with the pilot, our responsibility goes far beyond just multiplying manpower, equipment and facilities. In other words, our timetable for growth must *always* be based on the maximum that can be accomplished *without sacrifice in the high quality of our precision products!*

Eclipse-Pioneer

TEREBORO, NEW JERSEY • DIVISION OF



WORLD'S LARGEST PRODUCER OF AVIATION INSTRUMENTS AND ACCESSORIES

Export Sales: Bendix International Division
72 Fifth Avenue, New York 11, N. Y.

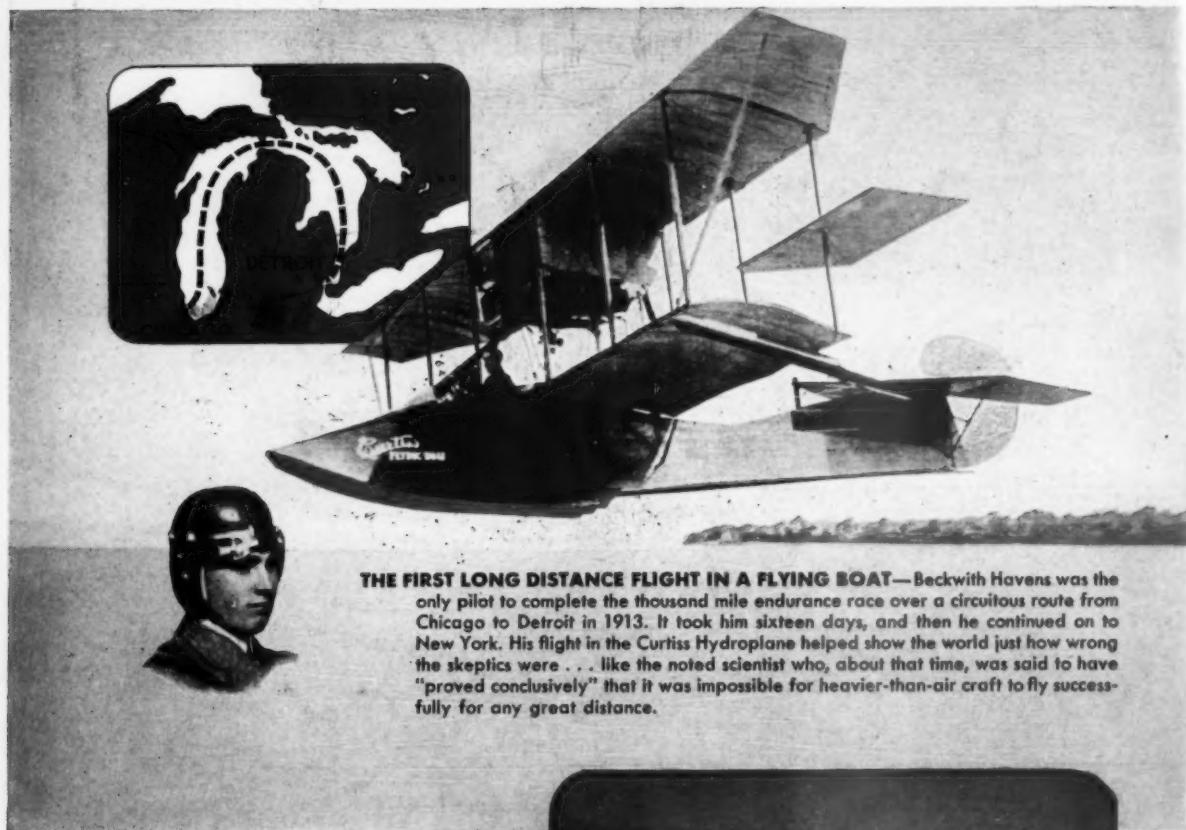
PRECISION PRODUCTS*
MADE BY
ECLIPSE-PIONEER

Automatic Pilot and Flight Path Control Equipment
Navigation Instruments • Power Supply Equipment • Air Pressurization and Ice Elimination Equipment • Engine Starting Equipment • Oxygen Equipment • Precise Components for Servomechanism and Computing Equipment • Sand, Permanent Mold and Die Castings of Magnesium and Aluminum

*Manufacturing capacity is now available for a great many models of these products.

Airplane and Engine Instruments • Flight and Navigation Instruments • Air Pressurization and Ice Elimination Equipment • Engine Starting Equipment • Oxygen Equipment • Precise Components for Servomechanism and Computing Equipment • Sand, Permanent Mold and Die Castings of Magnesium and Aluminum • Plaster Mold Castings

Havens Flies Hydroplane From Chicago To Detroit • 1913



THE FIRST LONG DISTANCE FLIGHT IN A FLYING BOAT—Beckwith Havens was the only pilot to complete the thousand mile endurance race over a circuitous route from Chicago to Detroit in 1913. It took him sixteen days, and then he continued on to New York. His flight in the Curtiss Hydroplane helped show the world just how wrong the skeptics were . . . like the noted scientist who, about that time, was said to have "proved conclusively" that it was impossible for heavier-than-air craft to fly successfully for any great distance.



IN 1953 over a distance comparable to that flown by "Becky" Havens in 1913, United Air Lines' new DC-6B Mainliner, cruising at a speed of 300 miles per hour, can make the flight in approximately 3 hours.



AVIATION PRODUCTS

AVIATION DIVISION
PHILLIPS PETROLEUM COMPANY
BARTLESVILLE, OKLAHOMA

1903



50TH ANNIVERSARY OF THE AIRPLANE

1953